NATURE MAGAZINE

cember, 1943 35 Cents Vol. 36, No. 10

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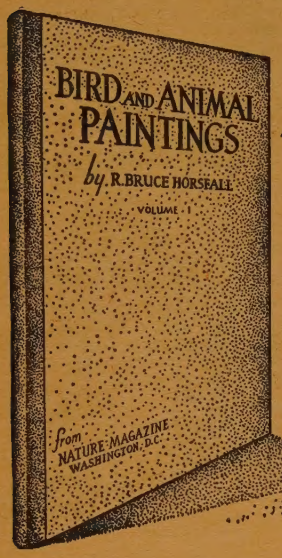

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Have you not often wished for an accurate source of information about the name of a bird or animal or insect? On a walk, a camping trip, or while exploring new country, how often arises the question "What is it?" An animal flashing through the underbrush or scampering across the trail instantly arouses one's curiosity. For lovers of nature who wish to become familiar with the various species of wild life in this country, we offer a valuable aid and a genuine bargain in this book.

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by R. Bruce Horsfall

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Despite the high cost of color plates and printing, this beautifully printed, 58-page book, with its many pictures, is offered to readers of Nature Magazine at only $1.50 a copy. Send your order with remittance to

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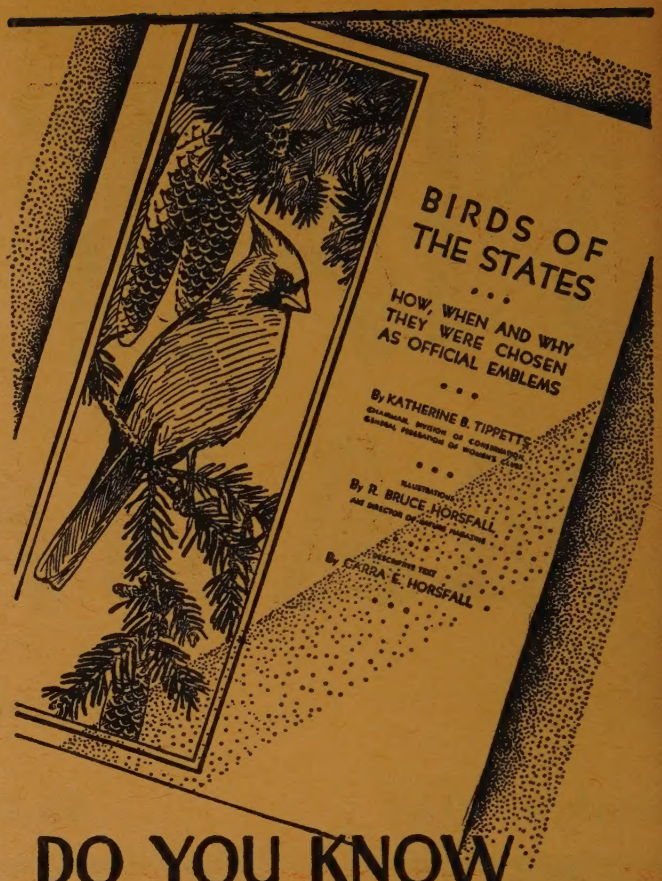
BIRDS OF THE STATES
HOW, WHEN AND WHY THEY WERE CHOSEN AS OFFICIAL EMBLEMS
By KATHERINE B. TIPPETTS
By R. BRUCE HORSFALL
By CARRA E. HORSFALL

DO YOU KNOW The Bird of Your State?

or of the 32 other states that have adopted official birds?

The movement to select an official bird emblem for every state continues. Thirty-two states and the District of Columbia have officially chosen bird emblems. Is your state included? This booklet will show you how your state stands.

The fascinating story of how, when and why the various states selected the birds to represent them is told in this book by Katherine B. Tippetts, former Chairman of Conservation, General Federation of Women's Clubs. Illustrating the book are 30 full color paintings of the various birds by R. Bruce Horsfall, the famous wild life painter, with descriptive text by Carra E. Horsfall.

Every home and every school should have this book. It is a fascinating bit of history combined with an authentic and interesting survey of the birds of America. A handy table in the front lists the birds together with the official flowers of the states.

The 16-page book, with 30 illustrations, is offered to readers of Nature Magazine at 25 cents a copy. On orders for ten or more copies, the price is 10 cents a copy.

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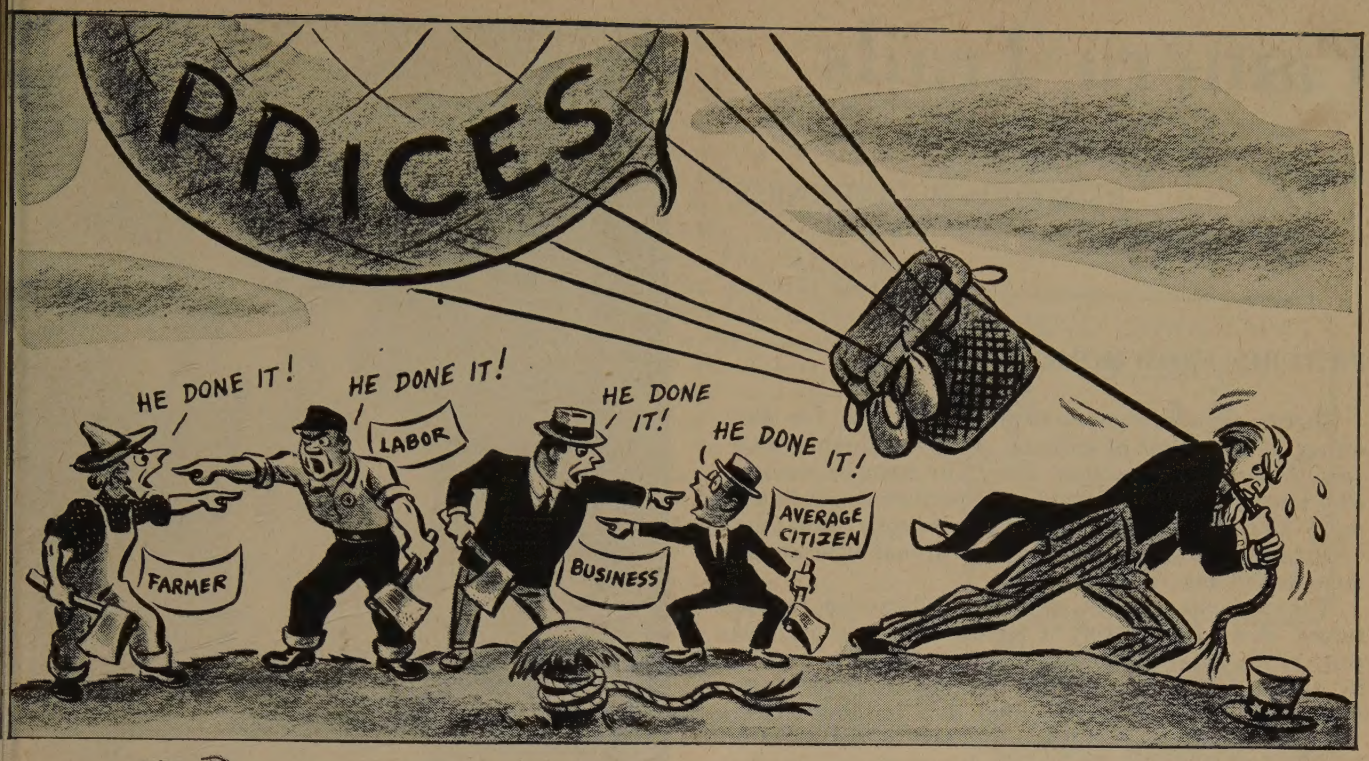
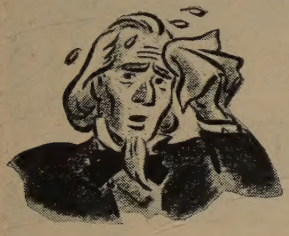




Never mind "who done it"—pitch in and help *get* it down!

THIS IS YOUR UNCLE SAM talking—but I'm going to talk to you like a DUTCH uncle, to keep all of us from going broke.

Ever since the Axis hauled off and hit us when we weren't looking, prices have been nudging upwards. Not rising awfully fast, but RISING.

Most folks, having an average share of common sense, know rising prices are BAD for them and BAD for the country. So there's been a lot of finger pointing and hollering for the OTHER FELLOW to do something—QUICK.

The government's been yelled at, too. "DOGGONNIT," folks have said, "WHY doesn't the government keep prices down?"

Well, the government's done a lot. That's what price ceilings and wage controls are for—to keep prices down. Rationing helps, too.

But let me tell you this—we're *never* going to keep prices down just by leaning on the government and yelling for the OTHER FELLOW to mend his ways.

We've ALL got to help—EVERY LAST ONE OF US.

Sit down for a minute and think things over. Why are most people making more money today? It's because of the SAME cussed war that's killing and maiming some of the finest young folks this country ever produced.

So if anyone uses his extra money to buy things he's in no particular need of . . . if he bids against his neighbor for stuff that's hard to get and pushes prices up . . . well, sir, he's a WAR PROFITEER. That's an ugly name—but there's just no other name for it.

Now, if I know Americans, we're not going to do that kind of thing, once we've got our FACTS straight.

All right, then. Here are the seven rules we've got to follow as GOSPEL from now until this war is over. Not some of them—ALL of them. Not some of us—ALL OF US, farmers, businessmen, laborers, white-collar workers!

Buy only what you need. A patch on your pants is a badge of honor these days.

Keep your OWN prices DOWN. Don't ask higher prices—for your own labor, your own services, or goods you sell. Resist all pressure to force YOUR prices up!

Never pay a penny more than the ceiling price for ANYTHING. Don't buy rationed goods without giving up the right amount of coupons.

Pay your taxes willingly, no matter how stiff they get. This war's got to be paid for and *taxes are the cheapest way to do it.*

Pay off your old debts. Don't make any new ones.

Start a savings account and make regular deposits. Buy and keep up life insurance.

Buy War Bonds and hold on to them. Buy them with dimes and dollars it HURTS like blazes to do without.

Start making these sacrifices now—keep them up for the duration—and this country of ours will be sitting pretty after the war . . . *and so will you.*

Uncle Sam

KEEP PRICES DOWN!

Use it up • Wear it out
Make it do • Or do without

This advertisement, prepared by the War Advertising Council, is contributed by this magazine in co-operation with the Magazine Publishers of America.

Camera Trails

By NORRIS W. HARKNESS

CHRISTMAS MORNING

PICTURES FROM HOME

Christmas offers made-to-order pictures for the owner of any kind of camera. Always valuable, this year they mean more than ever. The man or woman who has donned a uniform wants pictures from home more than anything else except letters. And the Christmas holiday is an ideal time to make these pictures for them.

If there is no member of your family in the armed forces, there is certainly a friend or neighbor, and you, as an amateur photographer, can do a service by taking your camera and making three or four simple shots that can be mailed in a holiday letter.

Good Christmas pictures are easy to make with any type of camera. They may be of several kinds. The first and simplest is of the tree itself—or maybe of the mantelpiece, if it is the center of your family celebration. The ordinary house lighting will be enough if it can be directed fairly evenly all over the picture area. The rest is a question of sufficient exposure.

The camera is set up on a tripod, or any other solid support that will not move during the exposure, and you focus on a point about one third the way from the nearest to the farthest object you want sharp. If you focus on the nearest branch, the more distant ones are likely to be fuzzy, and vice versa. Then, with all the packages and other things you want to show properly arranged, and the shades off the nearby lights, you check what the viewfinder includes and make the exposure. Naturally the camera is set level and at a height about the eye level of a sitting man.

Open the shutter on "Time" and give an exposure of perhaps 30 seconds at f/16 with the tree lights turned off. After the 30-second period, turn them on for ten more seconds to make them show, too. If you make the whole exposure with the tree lights on, the bright spots they make in the print will be out of balance with the rest of the picture and look queer. It may be that your room lights are weaker or stronger than average. In that case, the exposure will vary from the above figures, but 25 per cent of the total with the tree lights on is usually about right. I have made such shots in ten seconds, and, again, with exposures of twenty minutes.

Long exposures almost prohibit including people in the pictures, but adding more light with flood bulbs cuts the time down enough even to work well with children who will not sit still. Two bulbs arranged as shown in the diagram will give plenty of light that can be balanced as you please. Putting one quite high, and the other farther away and below the camera level, will give good modelling in the tree just as it does in portraiture, and faces will look well, too.

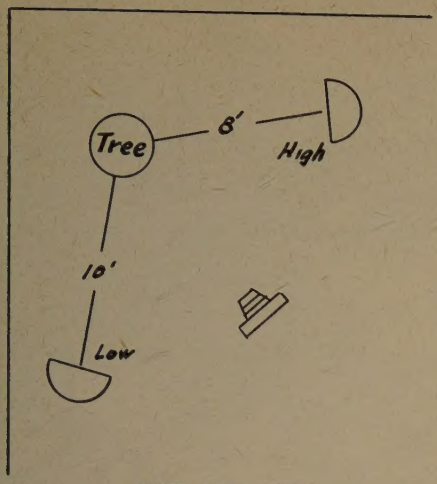
With the low bulb ten feet from the tree and the high one eight feet away (both in reflectors that intensify the light and keep it from hitting the camera lens) the exposure may be something like one second at f/11 on fast panchromatic film. If the youngster is keenly interested in what he has found in the package, he will sit still long enough for that exposure—provided you are lucky or can sell him the picture idea. I have used that system several times with good results.

In that case, you cannot use the part-time technique for the tree lights, but the greater intensity of the flood bulbs makes it unnecessary, and the balance will be all right even with the tree lights on throughout the exposure.

Now that flash bulbs are available again, try an open flash shot by opening the shutter on "Bulb," flashing the flashbulb, and closing the shutter again. With the bulb about eighteen inches above the lens and a foot or eighteen inches to one side, you can get excellent results at the diaphragm setting and distance given in the flash table. The small bulbs like the Wabash Press 25, or the GE or Westinghouse 5, give good open flash pictures at f/16 with the bulb ten feet from the tree in a room with average walls, but the tree lights will not show much.

The big advantage of the flash or flood-lighting is the ability to include people doing something and interested in it. Those are the pictures the boys in service want, and the ones you will treasure most in the years to come. So use either of those methods if you can.

But watch out that the lights do not hit the lens



THE SET-UP

and that you have stopped the diaphragm down far enough to get everything perfectly sharp. Fuzzy pictures are never pleasing.

Planning ahead makes so much difference in these pictures. If you think of making them after half the packages are opened, and perhaps some of the family have gone out, you will not get just what you want. Check over the lights and plan what you will do in every detail the night before—and then get to work as soon as the package-opening begins.

Questions and Answers

M.S.S., Maplewood, New Jersey, writes: "I want to get a few really good snow scenes this winter. What are your suggestions?"

ANS.—The important factors from the technical standpoint are exposure and lighting. Side-lighting is naturally the best for most shots but you may wish to keep the light more behind the subject, hiding the lens in the shadow of some convenient part of the subject. The exposure must be carefully checked since the contrast in the scene is close to the limit of the film's latitude. In bright sunlight the exposures will range from 1/100th second at f/16 to four times that with subjects containing greater shadow. A meter or calculator, together with a few trials and the experience gained in them, will settle the question. But with the technical details worked out satisfactorily, the shot will not be a picture unless it is "of" something, something that has sufficient interest to hold attention. That holds for any picture, but especially for snow scenes.

D.L.J. asks: "Why does a lens of short focal length distort the picture?"

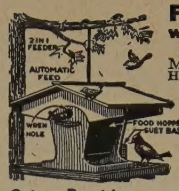
ANS.—It does not. The distortion, or rather the perspective, of a picture depends on the distance from the subject to the camera—and on nothing else. That is not quite true since the tilt of the camera can distort the image, but the camera is supposed to be held level, and, if it is, the perspective is a function of the distance. The reason is simple. The size of the image on the film depends on the distance from the lens to the object, exactly as is the case with the eye. Therefore, all objects at the same distance will have the same relative size, but objects nearer than these will be larger in proportion. Therefore, if you work at a very short distance, say one foot from your subject's nose, his ear, which is about six inches or 50 per cent farther from the lens, will be one-third smaller than it should be. In the resulting print, the nose will look far too large and the picture is distorted. The distance is what counts. The difficulty is encountered more often with lenses of short focal length because the image is smaller than with long ones and you usually work more closely to increase its size. That is why you blame the lens.

SQUIRREL STRATEGY

By Genevieve Bradford

A fox squirrel moved cautiously across the lawn, stopping and starting as it reconnoitered. Finally it started to move its tail as though flashing signals. Indeed, it was, for one, two, then three, babies emerged from a shrub and hurried to their mother. After a brief conference and apparent instructions, the mother continued her cautious way, leading her brood toward a rugged old spruce. High in the tree a storm had taken out a limb, leaving a ragged hole. That was the destination, and the family climbed the tree. Once at the nest hole there were a few moments of chatter, then the young subsided and the mother came down alone.

The following evening the mother led her brood down the tree and across the lawn to the roadway, all this with the usual caution and wig-wagging of tail. One youngster was timid, and after the mother had taken two safely down the road to a playground, she returned for the third. Inducing it to follow required some nose-to-nose discussion, but finally the baby consented to go along. We hope they will all be back to enjoy the hospitality of our two hickory trees and the supply of nuts kept for such visitors.



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NATURE MAGAZINE

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great National Resources of America

IN THIS ISSUE

December, 1943.....Vol. 36, No. 10

Camera Trails.....Norris W. Harkness 506

Contents Noted.....R. W. W. 511

Heart's Rue and Self-Defense
Wilfrid S. Bronson 513

Empire of Sand and Sun
John Lindsey Blackford 519

Sunrise (Poem).....Paul Churcher 522

Piedra Turkeys.....Charles J. Beise 523

Opinion (Poem).....Paul Churcher 526

Silk to Trip the Axis.....K. C. Howard 527

Oh, Come with Us (Song).....Grace Keir 528

Evergreens Forever.....E. Laurence Palmer 529-536

As We See It..... 537

Nature in Print.....Howard Zahniser 538

Henry Hicks, Missionary.....Andrew S. Wing 539

Antville Antics.....Virginia H. Ranson 541

Marco and Sheba.....Joanne Murie 542

The Southern Constellations.....Isabel M. Lewis 544

In Winter (Poem).....M. L. Allis 545

The School Page.....E. Laurence Palmer

Under the Microscope.....Julian D. Corrington 554

Index to Volume 36..... 557

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LIST YOUR DOLLARS ★ ★ ★ ★ ★ BUY WAR SAVINGS BONI

"*Eyes Right*" has never meant so much to America

Keen-eyed American fliers are telling Hitler and Tojo the inside story of democratic "decadence"—telling it in flaming emphasis—with two-ton bombs, torpedoes, machine gun fire. In selecting and training the boys who carry these messages, American military authorities employ the most critical physical examination and intense conditioning program. Throughout, particular attention is given to perfection of vision.

Nor is the importance of eyesight efficiency and visual care confined to the air fronts of this global war. On America's production lines, we cannot afford to waste time, to spoil materials through faulty vision.

Bausch & Lomb is supplier of eye examination instruments, lenses and eyewear to the military forces—as well as to the thousands of professional and technical men throughout America whose specialized skills keep civilian eyes at top performance levels. Producer, too, of a host of fighting optical instruments—range-finders, binoculars, anti-aircraft height-finders, photographic lenses, equipment for industrial research and control.

Here again, optical science is *seeing it through.*

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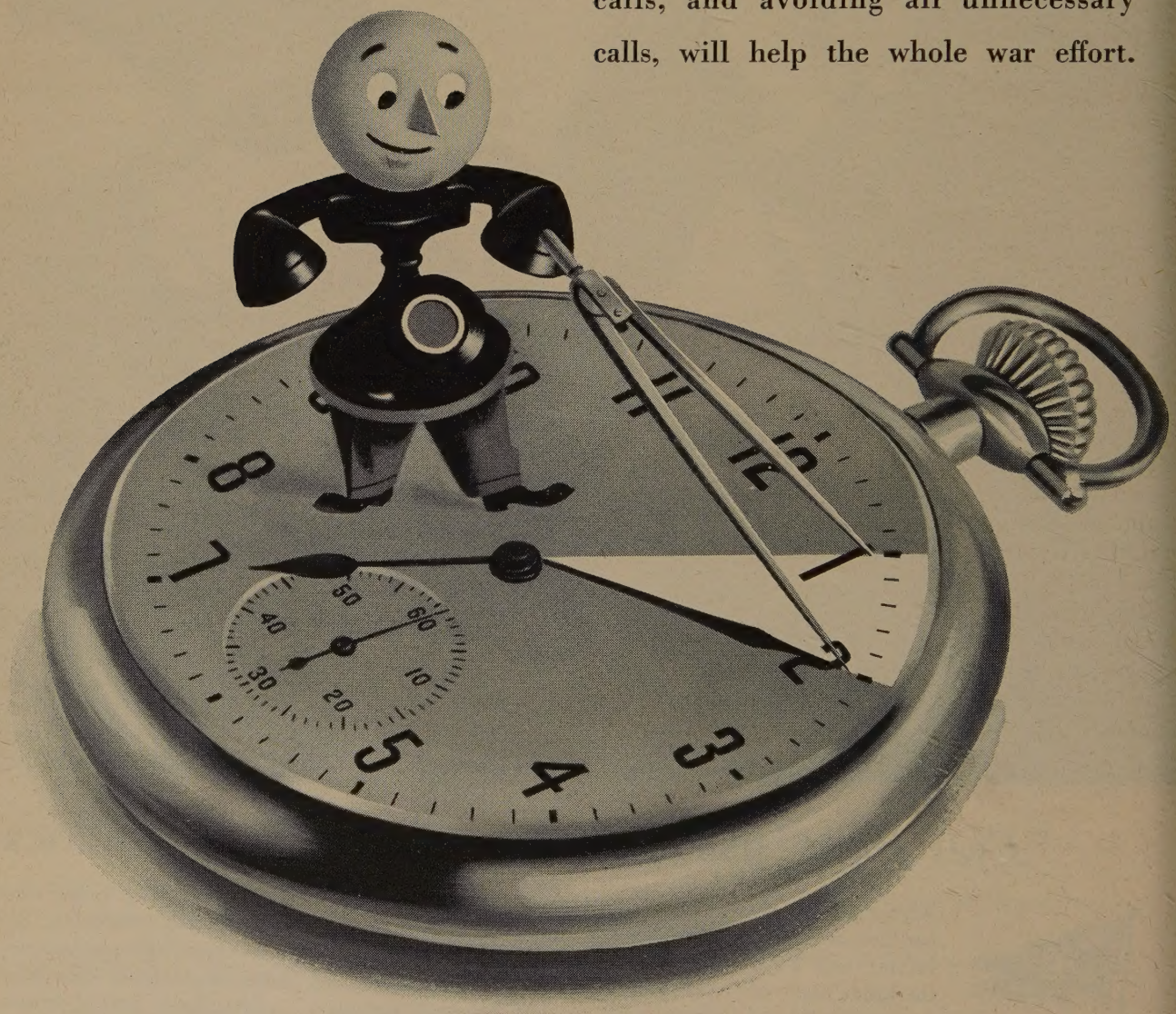
PLEASE LIMIT YOUR CALL TO FIVE MINUTES

When a Long Distance circuit is crowded the operator will say: "Please limit your call to five minutes."

Observing this time limit on essential calls, and avoiding all unnecessary calls, will help the whole war effort.

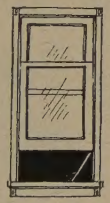


BELL TELEPHONE SYSTEM

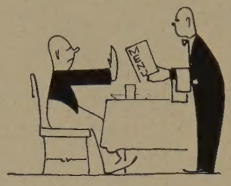
Contents Noted

That birds are symbols of peace in a time of international hatreds, and that bird enthusiasts carry on, war or no war, is indicated by a report in the *Journal of the Society for the Preservation of the Fauna of the Empire.* A starling was picked up by a dog in Sutton-in-Ashfield. On its leg was an aluminum ring inscribed "Vogelwarie, Rossiten, Germania, F. 308792." Rossiten is in East Prussia. Says the *Journal* of this indefatigable British society, which is carrying on the good fight in the face of difficulties: "The ringed [British for banded] bird, like Noah's dove, brings a message of hope, suggesting, as it does, that here and there, even in Prussia, a spark of decency and sanity awaits the breath of deliverance. We do not know the date of the ringing, but in any case let us hope that the ringer has not been consigned to a concentration camp for misuse of aluminium." Rudolph Hess, who earlier came to Britain by air, wore no leg band save the Nazi shackle.

Looking forward to those happier days after the war, Du Pont chemists picture a versatile future for nylon, now thought of largely and wistfully in terms of stockings. It will do duty in many things, from women's evening dresses and men's shirts to featherweight tents and scuffproof shoes. There will be automobile upholstery that will clean easily and rustless window screens. Nylon will have varied uses as a plastic such as tubing, crackless coated fabrics, carburetor diaphrams and coatings for electric wires. And—quite a boon, too,—there will be window sash cords that will last almost as long as the house. So we will wait for peace before we take that dining room window apart and put in the new sash cord.



Mussel chowder, broiled shark steak, side dishes of boiled milkweed pods and arrowhead tubers, a cup of fragrant sweet fern tea, and dessert of juicy and spicy dangleberry would be a healthful and tasty menu involving the surrender of not a single ration point. Yet probably the majority of Americans, lacking the pioneering spirit with respect to foods, would recoil at the thought. Sea mussels, abundant and delicious, appeared on the market in 1943, and a larger mussel-packing industry seems assured. Shark meat has spurted into favor along the East Coast. Demand for shark steaks and filets, like swordfish in texture and haddock in flavor, exceeds the supply. The other dishes are found in the wild and are there for the taking. Come on, you Daniel Boones.



In the fog-shrouded, wind-swept Bering Sea lie the Pribilof Islands, where, since protection brought the fur seals back in numbers, we have annually harvested seal skins and by-products under careful regulation. For a time the fate of the Islands was a matter of secrecy. Rumors had it that the Japs had landed, and fear was felt for this great herd. Now it develops that the islands were evacuated just as the sealing operations were started in June, 1942. Only 127 skins were taken. The 1943 harvest was conducted in secrecy because of its proximity to military operations, and a record take of 117,164 skins was made. Under a treaty with Great Britain, Russia and Japan, signed in 1911, allotments of skins were made in exchange for relinquishment of deep sea, or pelagic sealing. Since the treaty went into effect Japan has derived about $1,500,000, but the Japs declared themselves out not long before Pearl Harbor.

We will never cease to marvel at the resource of the plant detectives and the plant breeders. In India they turned up an inedible melon with only one asset—it refused to succumb to powdery mildew disease. So they brought it back and introduced it to market melons that took sick with the mildew in truly epidemic fashion. After many successive crossings they had a high quality new melon that has been ponderously christened "Powdery Mildew Resistant Cantaloup No. 5." It yields two hundred crates to the acre—much better than average—in the Imperial Valley of California. Another plant breeder triumph, No. 5, as it will be known on our market list, will appear on the market in 1944.

With sincerest wishes for peace in the New Year.

—R. W. W.

MAYBE IT'S "INNOCENT MERRIMENT"
THE TAIL HOLDS UNTIL THE FEET ARE SET
THE TAIL ALSO FEELS FOR THE NEXT BRANCH DOWN
Repeated reaction to a sphere (beet or potato). It looked like play but never went beyond this momentary attitude.
Asleep,~ body propped by ever useful tail,~ spirit bolstered by fancied company.
WSB
FIRST WITH ONE PAW THEN THE OTHER
WITH HIND FEET TOO
A FLEA CANNOT LIVE IN PEACE EVEN ON A PORCUPINE
ALL WET
READY
SHIMMY!

Heart's Rue and Self-Defense

with an epilogue on the

Foibles of Fatima

as recorded in word and picture

By WILFRID S. BRONSON

". . . what that chisel-toothed company did to my lumber for sheer fun almost rivalled in extent a night's work by a sober band of beavers."

IF MY conscience pricked me its goad was the quill from a poor old porcupine. Although well within Nature's primary law, I had "done a deed of dreadful note" and much more deadly than I had intended. For I killed a creature whose only crime was the pursuit of an insatiable interest in the taste and texture of various kinds of wood. That his persistent sampling of the siding meant the ruin of my house was beyond his dimmest sensing. His one reaction to this newly-risen pile was that it was wood, and wood of subtly unfamiliar flavor—therefore engrossing.

I do not doubt that a strangeness of quality in lumber from Oregon could be appreciated by that Catskill porcupine. His mind was monopolized much of the time by the smell and taste and toughness of whatever might be gnawed. Into that mind I had hoped to force a firm conviction that unpleasantness was sure to follow further gouging of my house. But I went too far, and then, to atone if possible, defend myself, and at the same time save the lives of all his friends and relatives, I took other measures with some interesting results.

Now, it may be true that against a pest of porcupines I would have been justified in killing these destructive rodents, as one sets traps in a cellar to catch the rats that threaten health and food supplies and make bad works with gnawing. But I did not have it in my heart to kill one of them, especially the old pioneer who proved to be the chief offender. I thought that by severe instruction I might teach him something. Perhaps, despite those who hold a porcupine's mind as dull as its spikes are sharp, I could reason in a rude and physical fashion with this nocturnal, smooth-brained, sharp-toothed spoiler of my sleep and sleeping quarters. My

argument would be just a handy stick for thumping on his armor.

Lighted by a bright May moon, and perhaps an inner glow of pleasurable anticipation, he had come at first merely to prospect in our compost pile. Each night he would spend one of the wee small hours rasping at old weathered soup bones there. Crunch, crunch, crunch!—then an interval for chewing. Crunch, crunch, crunch!—more chewing, and so on.

The chewing part was inaudible to us, but even through the noisy tumbling of the brook between the garden and the house, and across a space of some sixty feet, he could hear the slightest rustle of a bed-sheet. Invariably if either of us raised on an elbow to listen, all crunching would cease till we had lain statue-still, not even whispering, for a considerable time. Then lightly, but quickly growing louder as his confidence returned, the even alternation of rasping and chewing was resumed.

"Each night he would spend one of the wee small hours rasping at old weathered soup bones . . ."

In a few nights several large and rocky old bones had disappeared. Perhaps he needed a lot of lime for his new spring coat of quills. Whatever the reason, he finally had his fill and came in closer. That night we heard the thud of his heavy feet and the clack of his claws as he stepped on the little wooden bridge that spanned the stream. There followed a long spell of silence. Then, at last, came a delicate sound, the first light testing by the big orange teeth of the little bridge's timbers, followed, when we made no sound, by work in real earnest.

Shouting from the window would deter him while it lasted. But soon again the porcupine would be making sleep impossible and the bridge unsightly, or even unsafe. I needed to present my argument directly. His feelings must be injured where his heaviest quills and thick fat layer would protect him from any likelihood of serious hurt.

So, moving only as the porcupine gouged, I gradually got out of bed and into some slippers, fumbled for and found a flashlight, and made my way, a few steps at a time, to the door. To get this open, so creaky at two in the morning, as well as the screen door with its noisy catch and spring, took time. And all the while, so vigorously did he cut into the bridge that it seemed as though I might reach him to deliver my ultimatum only as he swallowed the final splinter.

Once out on the lawn in my nightshirt, armed with a broom picked up on the porch, I ran to the bridge and flashed the light suddenly on the demolition demon, a great old grandpa of some twenty pounds or more. He was up on the rail making fancy scallops all around the knots. This elevation gave me a chance to jab the broom handle at his unprotected belly, which I did right lustily. But the only noticeable result was a sudden perfuming of the air with the sour smell of fermenting wood, the ordinary odor of a porcupine, here enhanced by fear and much discomfort. I bellowed and prodded and whacked until he jumped into the gully and made for the woods, erect spines rocking on his fat back like an elephant's howdah, as he rolled from one out-board leg to the other, looking enormous in the spotlight that pursued him.

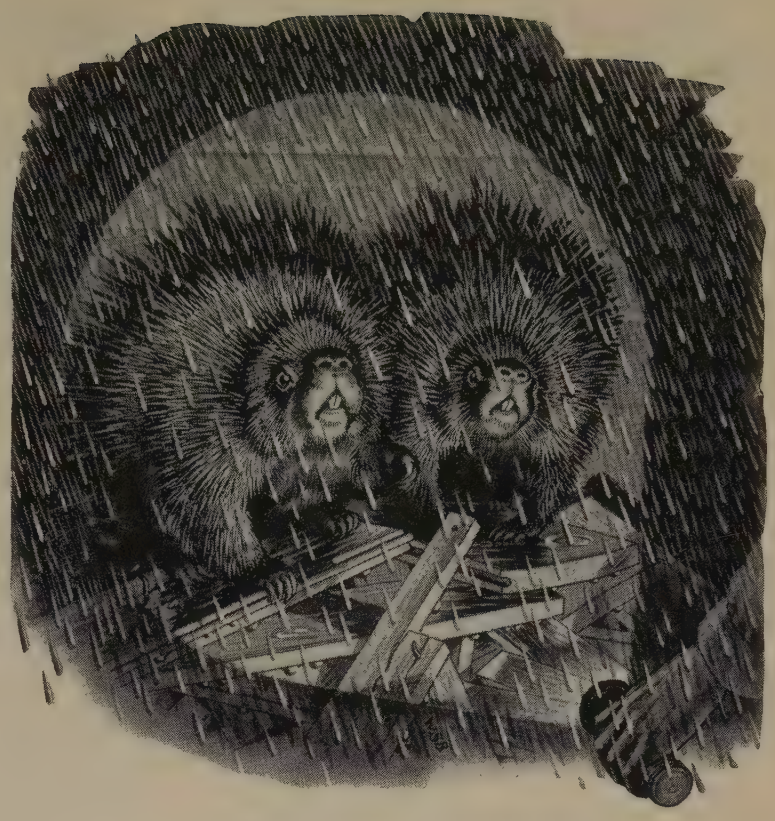
Do not think that one unpleasant episode on the bridge was enough. He came back the next two nights with the same result before his interest was outweighed by his distaste for my bad manners. When he failed to arrive on the fourth night I felt that my faith in his intellect had been justified. I was only too happy to have him close by if we could achieve a *modus vivendi* beneficial to us both. But he simply went to work in another sector.

Up the hill I had begun to build a study. The frame was up and the first layer of floor boards laid. By the looks of things on the fourth morning, the night had been one of high significance in porcupine society. Here the old prospector had spent the time entertaining all his prickly friends at my expense. All sizes and ages of porcupines had registered their attendance with pellets of digested splinters strewn about the floor. And what that chisel-toothed company did to my lumber for sheer fun almost rivalled in extent a night's work by a sober band of beavers.

The ends of half the boards and many two-by-fours not yet in place, were rounded neatly off. Others, not eaten at the ends, had been badly cut away along one side. Have you ever wondered what is meant in carpenter's terms by "furring"? I found a part of the scaffolding that fitted the word in its own peculiar way. One of the spiny imps, starting at the ground, had climbed the full fourteen feet of an upright two-by-four, tearing out big splinters but leaving them attached all around. It looked literally woolly, even furfuraceous.

The study was in a state of accelerating decomposition even as I tried to build it. But the next night the house itself joined study and bridge in the flux toward oblivion. The old patriarch brought along

"As I confronted them they scrambled up an untidy pile of old naily boards and stood on its summit, glistening, with every radiant quill veneered in rain."



his little coal black wife, and together they commenced on a corner of the bedroom right behind our heads. It sounded so loud that I had visions, as I stole from my bed once more, of a super-porcupine as big as the giant sloths of old.

I could not find the broom on the porch. But I had been cutting brush in the afternoon and there lay the long machéte, the only instrument of argument ready to my hand. "I'll use the flat of it!" I thought, and hurried out. A fine drizzle was falling. It was one of those nights that follow warm spring days, when a slow cold rain raises mists a little way and bends them down again, blotting out the sight of some familiar things, and bringing into eerie prominence shapes never noticed there before.

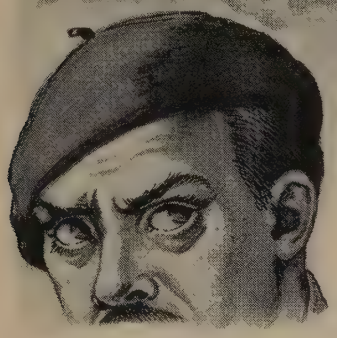
With a little thunder and lightning it would have been a perfect night for Macbeth's witches to be brewing up some dreadful business. And as I rounded the corner there stood a rodent Hansel and Gretel forcing on me a witch's part as they sought to eat the cookie wood of my very house. As I confronted them they scrambled up an untidy pile of old naily boards and stood on its summit, glistening, with every radiant quill veneered in rain.

Though my nightshirt was already soaked and sticking to my shoulders, and the urge to give them hosy-ding was strong, I held the light steady and said my piece before beginning.

"You dad-blasted dim-wit!" I howled, "What must I do before you'll leave my stuff alone? Tear the bark from my trees all winter if you must, but stop tearing the sides off my house! I'm going to whack you now so you'll remember!" As I stormed at him the female eased away and down the pile while he turned sideways to me and shook his spike-ful tail in rebuttal. He may have meant to court my wrath until his lady could make her getaway. I will not say he had no impulses of chivalry. The impulses he had toward my dwelling were all that mattered to me then. I still hoped not to have to slay a single porcupine, although faith in my ability to make this old gouger see my side of things was growing weak. Then darkness and the rain, promoting accident, changed my approach. I raised the heavy bush-knife, meaning to hit him with the flat of it harder than I had ever walloped him before. As I struck, one slipper snagged on a bent nail, the other foot skidding in mud. The downward force of the blow was increased by a spasm of effort to avoid falling forward, my face in quivering quills.

In the same split second of impaired coordination the flashlight left its mark, and when I trained it on the poor old porcupine again I was horrified to see that I had struck as much with the edge as the flat of the blade. Worst of all, not only had the stroke gone wild, but it had landed on a porcupine's most vulnerable spot, his nose, from which blood spurted.

". . . we hoped that she had wandered away with a new devoted and diverting swain."



". . . the inky image of the little female porcupine filled my mind."

There I stood, like Macbeth, and, like him, no congenital killer, I was instantly in trouble with my conscience. But,

"If it were done when 'tis done, then 'twere well
It were done quickly."

Hurriedly, with a better managed blow, I put the poor animal out of mortal misery.

I left the body at the scene of the crime. Even while rubbing myself dry I planned to make misfortune serve a better end. Although apparently it was impossible to teach a porcupine by chastisement, what I did next day must have carried the idea clearly into the collective mind of the local porcupine population. For from then on, that summer, not one came near the bridge, or house, or study any more. Not one except the dead one's mate. She lingered near the scene of tragedy, though she molested nothing. I believe there is no proof that these creatures mate for life, but this was the season when one certain male may be the apple of some certain female's eye. And he was hers.

The sun came up warm next morning and before going to work on the study, I dragged the *corpus delicti* all around the bridge and house, lugged it up and dragged it around the study, and hung it from a strong branch in the hemlock woods between. Partly because the night's bloodly interlude had murdered so much sleep, and partly from the balmy sunshine, I grew drowsy as noon drew near. I put down my tools and stretched out on the unfinished floor to snatch a nap. And then "methought I heard a voice cry, 'Sleep no more!'" Well, not exactly. But no sooner had I dozed off when from the woods came the sound of someone crying.

I started up, wondering who could be there, for we have no nearby neighbors. But as I listened to that all too human wailing and those stifled sobs, the inky image of the little female porcupine soon filled my mind. Although I had never heard the like before (and hope never to again), I knew that it was she mourning her lost love. I stood up and the sounds stopped suddenly, but as I went down through the woods, I knew that she was there, and, although I could not see her, I felt the black eyes following my every move. It was a vivid, most disquieting sensation. I found the corpse no longer hanging from the tree but lying on the ground, the rope severed as by the sharpest knife. To cut him down with her chisel-teeth was all that she could do, and she had done it. The least I could do was to bury him and right away.

She did not gnaw our buildings but she did not go away, haunting the gloomy hemlocks, invisible to me but there. At night she would wander from the woods and pass the windows moaning in a sequence of syllables that rose and fell as she plodded along. If anything, this purely vocal interruption of our sleep was more disturbing than the rasping of the old boy's chisels on the house had been. For though she left everything meticulously alone, she left rue in my heart. But time and the developments that followed tended to replace such sentiments with others more agreeable to both man and porcupine, which brings me to another and sweeter story, a sort of epilogue—

The Foibles of Fatima

After about a week all audible signs of her sorrow ceased and we hoped that she had wandered away with a new devoted and diverting swain. But one

THIS IS NOT NECESSARILY ACCIDENTAL ~ IT OFTEN LOOKS DELIBERATE
THE STRADDLE-BUG STRIDE
THE TAIL AS AN EXTRA HAND
THE TAIL AS A PROP OR STOOL
THE TAIL AS A LEVER
FATIMA
QUILLS RISE INCIDENTALLY TO STRETCHING
THE COMPLETE RELAXER

night on coming home late, I found her scrabbling up a swamp elm sapling and decided to "detain her for observation" for a little while; to study and duly record her ways in paragraphs and pictures.

Catching her was simple. I shook the slender tree until she chose, perforce, to clamber down, then clamped a half-bushel basket over her the instant she reached the ground. Then, moving the basket on the cover, while she trundled unwillingly within, I carried her indoors and put her in a cage.

There is often nearly nothing in a name. The fact that she was fat may have been all that prompted me to label her Fatima, although in the back of my mind was something I had heard to the effect that in the Orient, world of her namesake, fatness was esteemed as commensurate with other forms of loveliness. Subsequently this northern Occidental porcupine's insatiable appetite for exotic tropical fruit made the name seem still more relevant.

"Wood chewers that they are, porcupines smell distinctly like fermented wood."

Of course, before much "normal behavior" could be recorded, she had to accept her captive state somewhat and learn to count me out as a threat to her bodily well-being. This did not take her very long. That first night there was considerable wire testing with tooth and claw, of course, and an occasional vexed "Ee-onx!", but she quieted down at last. With daylight she resumed her baffling study of the wire mesh, an entanglement of amazingly tough vines through which no exit could be found or forced. That day she had no appetite for anything but liberty and spent all her time between naps seeking a way out.

She would move along close to the wire, clacking her big orange incisors, or sit back and slowly turn her head from side to side, seemingly incredulous at the all-enclosing network of the wire. Tooth clacking, I later learned, might accompany a search for anything from freedom to tidbits. And perhaps it is concomitant to dreams, if you will concede that porcupines possess both conscious and sub-conscious minds. At any rate she often clacked her teeth while sleeping, with the cutting edge of her upper incisors resting on the floor, making two dents in front of her recessive chin.

By the second morning hunger began to take ascendancy over other feelings, and she would eat of the various leaves I put into the cage; but only when she supposed I was not watching. Frequently I have observed that animals, even as lowly as the frog, appear to understand preoccupation. It may sometime irk our pets who feel neglected, but it puts wild creatures at their ease. "An idle human may be dangerous; a busy one is not," they seem to think. Small mammals in my "protective custody" for short periods, orphaned or injured as a rule, have pursued their own activities in cages close to my elbow just as long as I have kept busily at work, or ostensibly so. But let my scribbling pencil stop, let my eyes turn toward them and, if not apprehension, then something very like that mild form of fear—self-consciousness—inhibits them.

So it was at first with my Fatima. If I looked directly at her she would drop whatever she was munching, bristle a bit, and hide her face in a corner. When nothing happened she would take a covert little backward look as though wondering why I did not come within range of her spike-studded club of a tail, which twitched ever so slightly now and again. With her cage on my writing table I could stop to make notes and sketches of any interesting thing that she might do, then write steadily on, outwardly ignoring her.

By mid-afternoon of the second day this continuing propinquity, devoid of danger-threatening conduct on my part, had so reassured her that she began to feel and try to satisfy a growing curiosity about me. Almost as slowly as her backboneless prototype, the spiny urchin of the sea, she came forward until she sat with claws hooked through the wire, her black bulging eyes blinking, her nose wiggling rabbit style, although much more slowly. Timing my moves to match her own, I kept scratching pencil on paper while placing the knuckles of my left hand near her nose. It wiggled faster now, and as the spines on her head began to rise I took my hand away.

Next day she took a leaf from my fingers but did not eat it, holding it in one paw and eyeing me uncertainly for some time. Then she dropped it and moved away. The day after she accepted a biscuit and ate it, plainly with relish. Thereafter she received much of her food this way and came to associate prandial pleasures with my presence.

Although I put clean water into her dish each day, it remained always at the same level. Yet the litter on the cage floor needed frequent changing. Were porcupines, although not inhabitants of arid areas, among the animals that make metabolic water and never need to drink a drop? (Continued on page 548)

Golden-spined jumping cactus and scattered creosote bush growing together in the empire of the sun that is found in central Arizona.

Cholla and creosote are partners and hosts in the—

Empire of Sand and Sun

Photographs by the Author

By JOHN LINDSEY BLACKFORD

WITHIN the broad rain-shadow flung eastward by high coastal ranges, over arid mesas, across thirsty *bajadas*, upon desert *malpais*, up from the salt and alkali sinks of the Southwest, stretch the vast communities of cholla cactus and creosote bush, strange partners of the empire of the sun.

Defiant of man, guarding itself with terrible, treacherously-barbed thorns, the cholla has even marched out of the torrid wastes of the desert and advanced upon the enclosing ranges. Traveling with cholla under the blazing Sonoran sun, creosote bush, or covillea, demonstrates the lessons of adaptability. Its small, varnished leaves glistening darkly, and its blackish stems, etched sharply against the light, pervious soils of the desert, may be all you will see for a hundred miles.

Yet to those who know their habitat well—the drowsy chuckwalla, the clownish cactus wren, the sly kit fox—cruel cholla and barren creosote are veritable havens of refuge. Under spiny guard of the "jumping" cholla, armored corps of the desert, and within the trackless, dull green sea of the covillea, thrives a unique association of wildfolk that give an invader much to tell. To meet with rare and wary desert denizens is not unexpected where desolate distances of the creosote and formidable armament of the cactuses afford unrivaled protection. I recall an encounter deep in the cholla "gardens" of central Arizona. . . .

A lithe hunter, a desert wildcat, materialized silently from a palo verde tangle, on the rocky rim of an arroyo. Much to my surprise, he did not recognize what he saw when he turned toward me with baleful eyes. I froze instantly, although I seized the

The busy cactus wren brings a meal to its fledglings in a seemingly inhospitable nest site in a golden-spined jumping cholla cactus. Thrashers of several species find this country attractive, and the Palmer thrasher, below, poses at its nest in the same bush that harbored the family of wrens.

moment after he appeared, and was surveying the dry wash, to stealthily whip out binoculars. With pack humped on my back, and an untainted wind whistling across twenty-five feet between us, it was not strange that he did not know this odd thing for a man. With the glasses it seemed that I could reach out and stroke the pale, tawny pelage, or rub the soft, tufted ears.

But he was not interested and did not look at me again. He flowed leisurely down through the catsclaw and creosote, and, although I commanded an almost complete view of the arroyo, I did not see him leave it. Several minutes waiting was all I endured. I had to see that last gravelly reach of the streamway, screened by flame-fingered ocotillos.

He was lying in the catsclaw not far under the rim. At least, that was my impression. Instantly his sinewy body shot down, across, up the sharp arroyo wall into the low maze of the far creosote scrub. The blurred paws, the rippling hide on his back—they were gone, even before I could regret my haste.

I dropped down into the wash, cut out of it and off at an angle towards the Hieroglyphic Mountains. Then came a swift postscript. Streaking directly across my path, from the direction taken by the cat, two Arizona jacks arrowed past. Always before the lanky, burro-eared rabbits had leaped away. Now they did not bear an inch from their straight course in front of me—and they must have left holes in the air behind.

It was near this spot that I was edging through a narrow alley in the hostile cholla. A million treacherous spines poised eager for a thrust at the intruder.

Abruptly I halted at sound of a chill slithering in the rear. Half a dozen steps back, a rattler glided sinuously across the flinty floor of the corridor. The diamond-back coiled meaningfully beneath the myriad stilettos of a cactus fortress. What an unmistakable invitation the formidable pair gave me not to return!

In their victory over blasting heat and withering aridity, the chollas have assumed many fantastic forms. Cursed cholla creeps like a carpet of evil over the searing sands. Spiny tree cholla branches six to fifteen feet into the air, adorning itself in May with a rainbow of bloom, and in July with yellow fruit. Jumping cholla is a dwarfed tree crowned with bristling, snarled, Medusa-like locks. Teddy bear cactus wears impenetrable armor of interlocking spines clad in golden, straw-like sheaths. Its joints dislodge so willingly that they fall upon unwary flesh like the vicious slap of a porcupine's pugnacious tail. With hooked barbs, the spines frequently defy extraction, festering slowly in the tortured wound. I have had the flesh of an unfortunate finger swell so rapidly as to bury broken thorns before a pin could be found to remove them.

They exhibit odd habits, these fierce dwellers in the desert, that endure its intense light and meager, gravelly soil as readily as its torrid heat and pursuing thirst. On many, flowers and fruit grow in chain fashion, the plant still carrying a crop ripened possibly ten years before, together with succeeding generations, green fruit and new bloom. Some drop joints that root as readily as the bulbous fruit, while the seed, although viable, may not increase its kind for seasons to come. Fine spicules raise an effective, although unrequired, second defense behind stouter spikes. Evanescent blossoms open as by the clock and usually close at evening, not to show again.

Without any of its partner's ferocious weapons, creosote bush dominates illimitable basins, mesas, and sinks merely by persistence and admirable hardihood. Spaced methodically every few feet over the parched chert and sandy desert floor, *hediondilla*, "the little bad smeller," exhales its acrid, resiny scent from deep in Old Mexico to Nevada and Utah. Arousing itself from February into May, creosote brightens its dark evergreen mantle with a burst of golden blossoming. Then follow fuzzy, white, flower-like seed-balls. With the suppressing heat of summer, creosote browns its leaves a trifle, sinks into the drought dormancy that defies a relentless sun, and, if winter rains should finally come, awakens once more to renew a story of tenacity and courage.

A young mourning dove finds the spines of a "flapjack" cactus no barrier to a roosting place. No doubt it began life in a nest that was no more than a shallow platform of twigs built within the bristling embrace of a cane cactus or one of its relatives.

Both cholla and creosote welcome congenial company. Often they admit yucca, palo verde, ocotillo, burrobush, ironwood, Joshua tree, and old saguaro to cosmopolitan stands. More frequently they travel together; or cholla, such as golden-spined jumping cholla, clumps together, while creosote, particularly on the California deserts, starts out on its own across barren benches, trackless *bajadas*, and broad outwash plains to conquer the desert alone. In the Panamint it passes the endurance limits of most other plant life, and continues on, a stunted and cowering shrub only two feet high.

Where creosote and cholla go, they take their own peculiar bird friends. Thrashers, characteristic of the sun-baked, succulent deserts of the Southwest, spade up the bleached soil, flick over the flinty stones with pickaxe bills, or skulk through the cactus-creosote mazes. Swiftly glimpsed as he sprints away amid the creosote of the hottest, lowest playa valleys and barest terraces, speedy, sand-colored Leconte's thrasher is

almost never flushed when his pursuer follows afoot. Bendire's thrasher prefers the cactus flats and mesquite thickets. Liquid Palmer thrasher songs, pouring from weird cholla pedestals at deep dusk, just as stars commence to glitter above the wrinkled Santa Catalinas, give inspiration to many unforgettable desert hours. All find the guardian spines of the dread "jumping" and buckhorn chollas safe answer to their problems at nesting time.

It was while photographing a dutiful Palmer thrasher, attending her blue-green eggs in a cholla fortress, that I found my camera mounted almost on the doorstep of an excited neighbor. It was March 18. Cactus wren nesting would not become popular until mid-April along the Hassayampa benches; yet here was the camera much in the way of the feeding of four speckle-shirted youngsters about ready to leave their spiny nursery. It must be a rare golden-spined cholla that during its prickly lifetime never cradles the nestlings, the winter headquarters, or the dummy nest of a clamorous cactus wren. In deserts hospitable to gila monsters, innumerable lizards, snakes, hawks and owls, the fierce chollas are guardians and godparents to countless fledgling birds.

Black-throated desert sparrows find the strange covillea-cactus partnership always to their liking. Sleepy Texas nighthawks doze out the dazzling day on its shimmering floor, and sweep its sultry air at evening. The house finch and sprite-like, black-capped plumbeous gnatcatcher are old-timers here. The adaptable mourning dove commonly collects her shallow platform of twigs in the bristling embrace of a cane cactus, or perches it in the crotch of a tree cholla, confident of her security.

It was to refuge in the cholla that I watched a redoubtable road-runner flee before the aerial assault of a white-rumped shrike. The cheeky chaparral cock stood with wings raised to parry each thrust of the masked marauder; but he was repeatedly forced to duck his crested head and evade the attack. The pouncing dives of the little warrior routed him from a scattered clump of low mesquite, and frustrated each effort to return. What the mesquite held that so attracted the road-runner or inspired the shrike's vindictive assault I failed to discover. Likely the stout mesquite thorns had served as handy hooks on which to hang and cure the bandit's meat. And it may be the runner helped himself freely to spitted mouse or dusty lizard. Or possibly the feathery green of the mesquite foliage concealed a nest, and the shrike recklessly tackled feathered trespassers irrespective of size. At any rate he drove the chastened cock to cover in the armored arms of the encircling cholla.

Sunrise

By PAUL CHURCHER

Sun-gold tipped pens of morning wrote in rapture
Across the gray-green pages where dawn lay;
The sky was leafing through a blue-white chapter,
I touched the wind . . . and found another day.

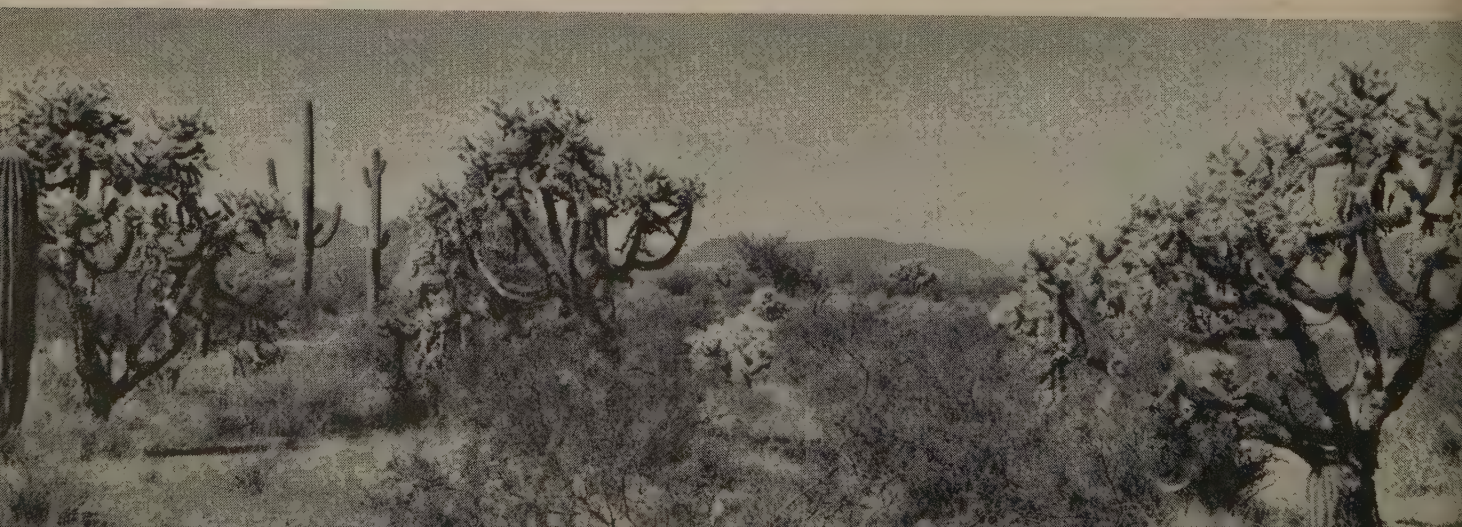
In this fantastic cactus the road-runner often places his own collection of sticks, mesquite pods, and snake skins that serves as nest.

In the spectral glow of Death Valley moonlight I have marked a big-eared elfin kit fox steal from the black creosote cover to investigate furnishings on my camp table. When he vanished phantom-like into that dark, aromatic mantle, I could only wonder what other unguessed mysteries it hid from me.

A challenging, loud *cha chaá* strikes the upbeat of a fresh desert morning; there comes the pattering of pedestrian feet on flinty rubble; soft querulous or reassuring conversational calls; the scuttle of racing forms to unassailable cover. These are all part of your day where creosote and cactus guard the companionable coveys of Gambel's quail.

Grim cholla is not always kind to its favored children. There was evidence of this one afternoon in Arizona on the hot Hassayampa Plain. The tortured air quivered above it as from the top of a red stove. A few satiny heat clouds (Continued on page 552)

Tree chollas stand out against a mountain background, with creosote bush in the foreground, in the dry and sunny land of southern Arizona near the Mexican border.



Corn spread on the snow brings these Colorado wild turkeys to a free meal so that they will unwittingly pose for the camera of photographer Frank Wommer, Jr.

With only a few left by hunting and weather, man seeks to aid the comeback of the—

Piedra Turkeys

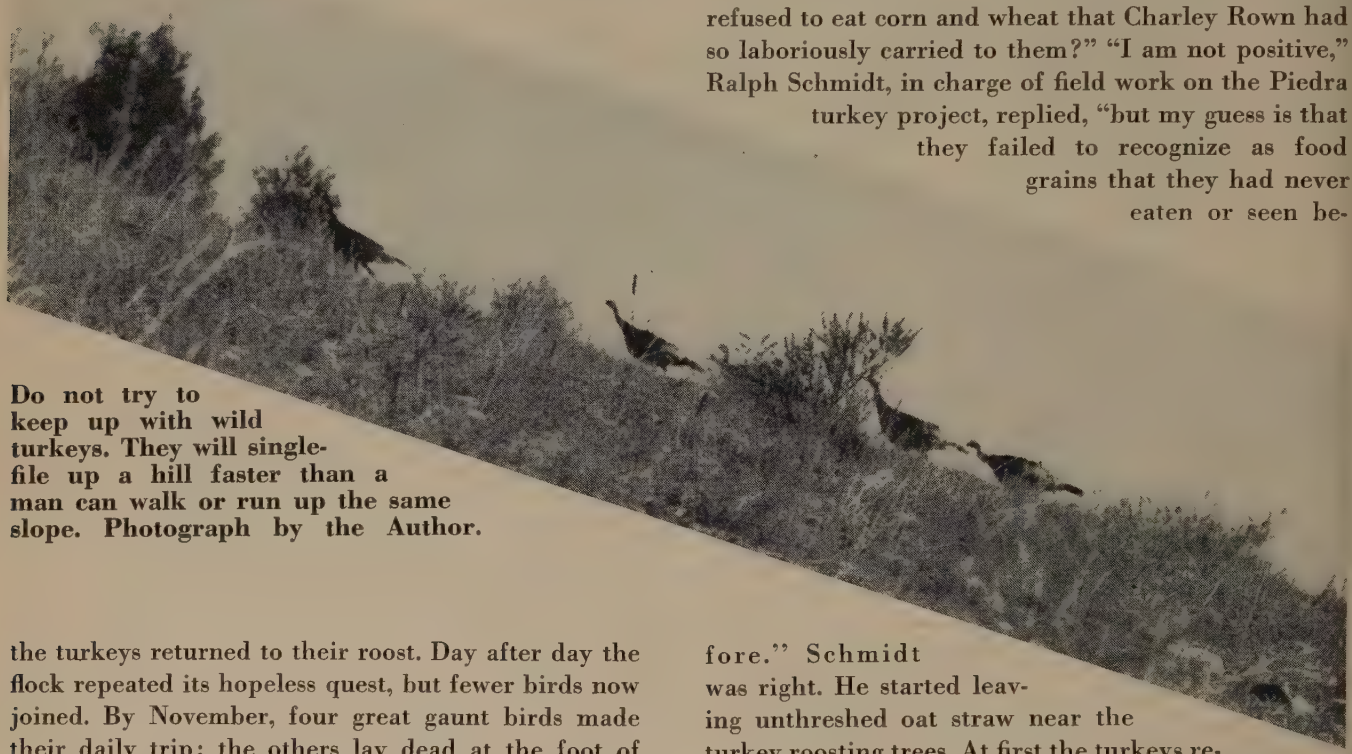
By CHARLES J. BEISE

On the afternoon of October 20, 1932, a sudden fierce gust of wind rattled the few withered leaves remaining on the oak brush along the Piedra River of southwestern Colorado and snatched them from their fastenings. Silently but ominously wet swollen clouds settled over the hilltops. Then, as the wind ceased, heavy flakes, like large pieces of cotton, began to fall. The ground was soon covered and all night the trees put on layer after layer of white covers. Only the snapping of branches resounded in the canyons as it continued to snow. On the afternoon of the third day the storm ceased as suddenly as it had started, leaving behind it five feet of snow. That night a new moon over Haystack Ridge cast long slant shadows between buried pines. It grew warm, and then as suddenly turned cold. By dawn tiny ice particles of crusted snow reflected the gray morning light. The crust was solid.

Five turkeys began calling from a big pine on the east slope of First Canyon, where they had fasted for three days. Other turkeys answered from nearby pines, nervously shifting their feet along their iced perches. For three days and nights they had perched there, locked in the storm's prison. With a great swish of air a huge gobbler left his perch and glided to an opening on the floor of First Canyon, where he was

joined by other turkey hens and gobblers, all equally hungry. Cautiously the old gobbler looked over the buried sage flats for signs of coyote or eagle. Seeing none, he struck the snow crust with a tremendous back thrust of his foot. Heavy-horned toes slid over a smooth icy pan, making barely a mark on its surface. Locked beneath five feet of snow were the weed seeds, acorns, and pinyon nuts on which the turkeys depended.

Other birds, too, joined the flock in their futile quest for food. Here and there the top of a skunk brush showed. A fortunate bird found a mouthful of food and hastily devoured it. As evening shadows lengthened the turkeys returned to their roost. Day after day the flock repeated its hopeless quest, but fewer birds now joined. By November, four great gaunt birds made their daily trip; the others lay dead at the foot of sheltered tall pines on the south slope of Devil Mountain. During the bleak cold months before April a coyote was to catch one of the four remaining turkeys who, although he knew of the coyote's charge, was too weak to take flight.



Do not try to keep up with wild turkeys. They will single-file up a hill faster than a man can walk or run up the same slope. Photograph by the Author.

The warm Chinook wind of late March, sweeping north of Chimney Rock, saw only three turkeys where a year before there had been hundreds of the giant birds.

"It was everywhere the same," Charley Rown, forester stationed on the San Juan, entered in his diary on October 25, 1932. "I have this day covered twenty miles on webs, packing corn on my back and leaving it near the turkey roosts. The birds refuse to eat corn or wheat. The snow under the roosting trees is covered by dead birds." The Forest Service, the following summer, tallied approximately thirty turkeys where the previous fall there had been many hundreds.

In November, 1942, I went on the range where the thirty birds had survived ten years before and a conservative estimate of wild turkeys in the same area would be at least 900 birds. An increase of capital in a ten-year period of 3000 per cent without the organized aid of man.

"If the turkeys could do this well unaided, what could they do with a little help? Why not help the birds and in a few years have a turkey hunting season?" was the query. So the Federal Aid Division of the Colorado Fish and Game Department, under the Pittman-Robertson Act, with the cooperation of the United States Forest Service, has undertaken a campaign of re-stocking.

There were many obstacles to the program, and many riddles. For instance: "Why had the turkeys refused to eat corn and wheat that Charley Rown had so laboriously carried to them?" "I am not positive," Ralph Schmidt, in charge of field work on the Piedra turkey project, replied, "but my guess is that they failed to recognize as food grains that they had never eaten or seen before." Schmidt was right. He started leaving unthreshed oat straw near the turkey roosting trees. At first the turkeys refused it; then they discovered it contained the food they sought. The same is true of corn and wheat.

One who locates a flock of birds in October or November may look in vain for a gobbler. As with elk, the toms ordinarily stay apart from the hens except during the mating season, which generally starts in the middle of March, when the great birds strut fearlessly, courting the hens of their choice. During this time of year a gobbler will answer almost any noise with an explosive series of gobbles that ring and echo in the walls of the canyon, and he offers easy prey to predators and poachers. Not ordinarily heard but equally characteristic is the "boom" the ardent tom emits. The "boom" is a low-pitched and resonant sound. One might think this to be caused by the scraping of stiffly-arched wing tips on the ground, but close observation will disclose it is apparently a vocal sound, although no corresponding expansion or deflation of the breast can be detected. As the mating season progresses each tom will go to his own "bailiwick"

where he reigns, and other toms will not enter the exclusive territory. Their courting finished in April, the gobblers ignore the hens and stay by themselves, but in the winter months prior to March large numbers of gobblers may be found banded together and frequenting relatively snowless south slopes.

Nesting hens offer the bird student one of Nature's greatest problems—finding the hens on the nest. Ordinarily, turkey droppings disclose presence of the birds, but as if by magic no droppings can be found during nesting season. Frequently I have observed a hen on her way to water and have followed her afoot and by glasses as she started on her way back toward her nest, keeping a constant eye on her. One minute in plain sight, the next instant she has vanished, and all further search is in vain. "I have cross-sectioned areas in which birds were nesting on my hands and knees and have been unable to find the bird on her nest," is Schmidt's observation. So if you find a turkey nest you have seen a sight few ever see.

The wild turkeys of the Piedra River are not newcomers or hatchery birds. For more than a thousand years their ancestors have lived in this area. A cliff dweller wife treasured turkey feathers for the making of her feather blanket before the time of the Norman Conquest of England. The summit of Chimney Rock, a landmark in this area, is covered with the ruins of the cliff dwellings, many of which contained turkey pens. The bird that Benjamin Franklin nominated for our national emblem scratched and "purted" in the gray adobe mud of Devil Mountain long after the Indian cliff dwellers so mysteriously vanished; the Utes stalked Piedra turkeys through the pine and oak and even built hunting scaffolds in the oak trees near favorite watering holes of the birds, some of which scaffolds are still evident to this day, and the soda springs still supply the turkey with water.

The Sharp's rifle that drove the Ute westward took heavy toll of the great birds, and many a homesteader in the '80's and '90's shouldered his Winchester when in search of a Thanksgiving meal. Gradually the turkey flocks were reduced in number until the hunter abandoned his quest because the chance of a successful hunt was too remote, but the great birds were still there. No longer did they frequent the pinyon flats of the foothills or scratch in the fields of the rancher, but the tall pine forests of the rough country to the north were their retreat and sanctuary. There, befriended by ranchers in the winter months, the turkeys increased in the '20's and by 1932, protected by law, the flocks were again common. No organized plan of protection of the turkey nor any restocking or replanting program was undertaken until 1942. Turkey feathers found by archeologists in the ancient Indian ruins contain much the same coloration as the present day turkey, but to say that the strain has not been affected by the domestic birds is to belie the wooing powers of the wild gobbler. Ranchers have frequently awakened on a cold March morning to find that their tame turkey hens had disappeared and their tame gobblers were dead —and found the track of a wild gobbler near the turkey roost.

Where do you look for turkeys? One familiar with the country and the birds has no difficulty as he knows the seasonal route of the birds year after year varies

Turkeys run a short distance before they get into the air. In this photograph made by Author Beise the banding of colors on the wings of the birds is plainly visible.

A young gobbler hesitates to follow the other birds across an open spot. The snow hampers the progress of the heavy birds, who break through the soft crust. Photograph by the Author.

little. Turkeys are never far from water and normally every morning they will go for a drink, leaving their tracks along and near the water course. I generally parallel or follow a stream looking for sign and return to that area where I found the freshest sign at daybreak the following morning. If there are any birds within a mile or so one can soon tell as all turkeys "talk" on awakening and getting ready for the day's business, setting up a clamor that can be heard at a great distance on a windless day. Subsequent search in the direction of the clamor will reveal the roosting birds by droppings on the ground.

Hunters, of course, wonder about an open season, but the program is too new to justify an answer to the question. All agree that no season should be declared until the number of wild turkeys in the area has been established by an accurate census. In any event, the next ten years will tell the tale—whether or not, with man's assistance, the Piedra turkey flourishes better than he did before; whether management will restore the king of upland birds—the wild turkey.

Wild turkeys occur in Colorado at lower altitudes in its southern part, extending up the river valleys from their broader range in the South. These flocks, representing the farthest fringe of the birds' range, thus face extremes of cold and restricted food resources. They were originally locally abundant, and sacred in the eyes of some of the Indian tribes, but were heavily exploited in pioneer days, and forty years ago were thought to be headed for extinction. In 1902 the open season extended from August 15 to October 31. But in 1903, the turkey was put on the protected list, where it has remained ever since. Now the State Game and Fish Commission has accepted Federal Aid funds to study the condition of the turkey population, and immediately the question of opening the season has arisen. We await the result with interest.

★

Opinion

By PAUL CHURCHER

Boastful nimrod, you may "Never miss 'em."
I cannot match you; spare me the attempt.
This hunting out of season is a system
That keens your eye . . . and also my contempt.

California woman enlists regiments of spiders to supply strategic—

Silk to Trip the Axis

By K. C. HOWARD

BECAUSE she was familiar with the ways of insects, Nan Songer of Yucaipa, California, was able to organize regiments of black widow and other spiders and has gone to war in response to her country's call. Today minute strands from the silk-making equipment of these arachnids serve as cross-hairs in bomb sights, telescopic rifle sights and range-finders that are being used by the Allies in the fight against the forces of darkness.

Back in the foothills of southern California, Mrs. Songer, who has one son in the Navy, wondered what she could do in defense of her country. In her girlhood she had spent innumerable pleasant hours collecting insects. She had exchanged butterflies with collectors in many states, and had made a hobby of collecting and raising crickets.

One day the American Museum of Natural History wrote to say that the United States Bureau of Standards was seeking someone who could supply spider silk for use in the manufacture of sights for certain delicate implements of modern warfare. Mrs. Songer knew relatively little about spiders, but she had in her library *The Spider Book* by Comstock, and set about studying. It was not long before she was prepared to undertake a task unique in the war effort.

In the garden, along mountain streams, and in the desert she collected a considerable contingent of spiders, and many of their egg sacs. These she took home and placed in containers of all sorts, chiefly of glass. She provided the sort of food each spider seemed to relish. In this she made use of her hobby of cricket culture, for she found that these chirpers were favorites in the spider menu. Hearing of her

Nan Songer detfly winds spider silk on a wire frame, preparing it for use in bomb and telescopic sights. Her pet spaniel watches the process gravely, while in glass containers many spiders eat lustily awaiting their turn for "silking."

work, people shipped spiders to her from many parts of the country.

Between the hours spent in collecting and hatching hundreds of spiders, Mrs. Songer experimented with the recovery of their silk. This is produced by several sets of glands and is forced in liquid form through the spinneret at the rear end of the spider. It hardens on exposure to the air. Her husband made delicate frames of wire on which to wind the silk. Soon shipments were under way to the United States Government and to manufacturers making the various sights. Within a short while spider silk from the Songer Spider Service was a vital part of the equipment of Allied bombers roaring over enemy territory.

Some of the orders called for spider silk of one one-hundred-thousandth of an inch in diameter. Others were for silk two and one-half- to five-hundred-thousandths of an inch. By staking out her spider on a yucca pin-cushion on her worktable, Mrs. Songer could get hold of the silk at the spinneret and draw out the silken thread, cementing the end of it to her reel and winding on one hundred feet.

The smallest thread is obtained from black widow spiderlings six weeks old, but Mrs. Songer learned the trick of splitting the silk into its several strands, using tiny forceps to pick it apart. Black widows were collected far and wide; banded and golden spiders were more easily found; the desert yielded the gaudy, green lynx spider. This spider builds no web but lurks along the possible path of its prey and pounces upon it. It produces the finest silk obtainable for use in scientific instruments.

If a spider is allowed to live out its natural life span it may yield as much as one thousand feet of silk. Manufacturers pay Mrs. Songer from fifteen to twenty dollars for each one hundred feet of spider silk, depending upon its size and quality.

Few will envy Mrs. Songer working with the black widow spider for it is believed to be the only spider in the United States sufficiently poisonous to cause the death of a human being. However, she has worked for many months with them, has never seen one attack a person and has never been bitten by one. When her black widows are resting from "silking" she permits them to drop into her lap, crawl over her hands and run around the room. Her feeling is that handling spiders is much like working with bees, which she handles with aplomb. If you fear them they sense it, she says, and are likely to attack you. She firmly believes that her black widow spiders are more fearful of her than she is of them. In any event, they are good and faithful soldiers with a specialty.

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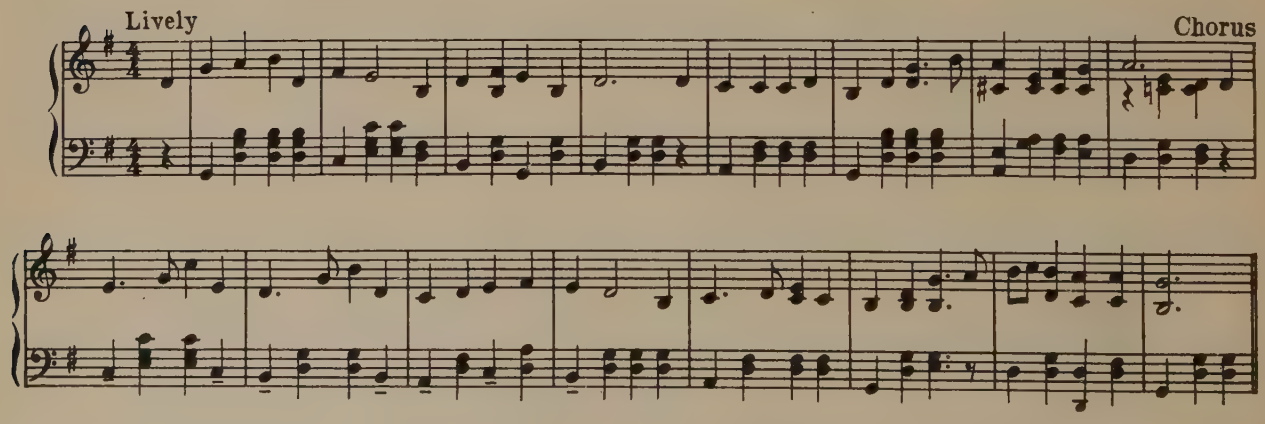
Oh, Come With Us

Words and music by GRACE KEIR

Reproduced from "Songs of the Open" by special arrangement with the publishers, Carl Fischer, Inc.



The sun shines on the hillsides
And drifts through leafless trees,
And wind blows soft into our face,—
Our spirit how it frees!

Chorus:
So come with us!
Oh, come with us!
And join our happy throng
For he who lives beneath the sky
Has always a heart of song!

The birds have come from sunny south,
Their songs trill through the brush.
The frogs have gathered at the ponds,—
When we go near they hush!

Chorus:
So come with us!
Oh, come with us!
And join our happy throng
For he who lives beneath the sky
Has always a heart of song!

This is the twenty-seventh in Nature Magazine's series of educational inserts.

Evergreens Forever

By E. LAURENCE PALMER

Illustrated by Elizabeth Burckmyer

WHITE PINE

SCOTCH PINE

LODGEPOLE PINE

PITCH PINE

MUGHO PINE

RED PINE

SAINT NICK's name stands for the finer things—beauty, honesty, generosity and kindliness. If it stands for beauty, we must make our surroundings beautiful at the time of the year we think of Santa Claus. For honesty, we must get that beauty without destroying the beauty possessed by others. And so we find ourselves forced to learn how to play fair in the matter of Christmas decorations.

Probably few people would wish to do away entirely with the use of evergreens for winter decorations, nor is it necessary that Yuletide beauty be placed only on a commercial basis. Above all, we do not wish to have beauty for ourselves at the expense of others.

Most of us who were brought up away from the larger cities, found youthful joy in getting our Christmas greens to decorate home, school or church. It was fun to select a tree, cut it down and drag it home. No one told us what trees would prove most useful. We did not think of the injury caused to a timber tree if we cut out the top. In most cases, we felled a number of trees before the expedition was over, and we took home only the one that seemed best. Some of us who now devote much energy to conservation were atrociously wasteful in our youth—so much so that we can appreciate the real need for conservation now.

The question of Christmas trees gives us a good chance to examine conservation ideas. We might say that we should use no natural evergreens for Christmas decorations, just as some would say that we should catch no fish, kill no game, cut no trees, pick no wild flowers, and, carrying the idea to a ridiculous extreme, use no streams for the purpose of generating water power. Such views would not accord with conservation good sense. We can and should cut some trees. We can kill some game, pick some flowers, catch some fish, and dam some streams, sometimes to the betterment of other trees, flowers, fish and streams, and certainly to the betterment of other people. In spite of some educators, it seems reasonable that if a boy learns the principles of conservation as they apply to a tree or a bird, he may easily transfer the application of those principles to other natural resources. Yet some educators find sound educational procedure in the endless repetition of similar sentences, in each of which only one new word or idea is introduced. An example of the technique of these teachers would be as follows:

We must not cut Christmas trees because they might grow into timber trees. We must not cut Christmas trees because they might prevent floods. We must not cut Christmas trees because the dead trees might cause fires. And so on. This technique might

AUSTRIAN PINE

DOUGLAS SPRUCE

RED SPRUCE

BALSAM FIR

be reserved for the training—not the teaching—of morons. Most boys and girls have too much sense to need this sort of thing.

This article does not try to cover all evergreens. It omits consideration of the use of club mosses, laurel, holly and of the many woody plants, such as black haw, whose bright red fruits are used in Christmas decorations. It deals only with the use of cone-bearing trees. It omits consideration of such cone-bearers as the cypress, tamarack and other species that shed their needles. Thus, from this article many others may be developed later without duplicating the material given here.

If evergreens served no other useful function than as Christmas decorations, our attitude towards such use would be different. But when a group of plants provides a major portion of the fuel used in some areas; much of the building material used in other areas; most of the turpentine and similar naval supplies for the world; a ground cover that will grow quickly where other plants will not survive or thrive; most of the tannin used in making leather in some parts of the country; cordage for some primitive peoples; important medicines for a variety of diseases; essential nut foods for whole tribes of Indians; the necessary food and shelter for many kinds of wildlife; most of the masts of the sailing ships, and the wood used in canoes and other small boats; much of the charcoal used in industry and the arts, and a host of other important functions, they cannot be sacrificed for the sake of a little beauty once a year. The evergreen cone-bearers here considered do serve all of these functions and many others. The details of most of these functions are considered in the accompanying chart section.

LONGLEAF PINE

NORWAY SPRUCE

In summarizing the importance of these plants, one should not overlook the contribution made to the sky-line by a lone pine high on a hill; the atmosphere provided by a dense grove of young spruces with its splendid carpet of needles; the challenge to our imagination that accompanies a trip through a grove of California redwoods; the aroma arising from a pillow filled with balsam needles, and the thrill of reading such essays as Enos Mills' "The Story of a Thousand Year Pine", or Rupert Brooke's verse, "Pine-Trees and the Sky".

If our interests are intellectual rather than economic or esthetic, these trees open a host of avenues to the inquiring mind. How many understand why some trees form pure stands while others commonly mix with other species? How many realize how reading the annual rings of these trees gives us a long-time calendar of our country, and sheds light on the activities of primitive man on this continent?

The story of the redwoods' antiquity is given to all school children, but how many are taught to read the life history of the spruce hedge around the school grounds? The more we think of these trees the more we come to feel that the questions they raise are almost as numerous as the rings of the oldest Big Tree, or the needles on the biggest Oregon pine. Think of a tree whose bark can survive a seven-day fire of logs piled close against it! Think of a tree that produces a fertile seed two years after pollination takes place, or may retain in the cone a fertile seed for twenty years! Think of an organism that we have every reason to believe could live for 10,000 years, yet spends only a few weeks each year in growing! Think of cones that rarely open to free their seeds until they go through a fire! These are only a few of the thoughts that crowd in on us from all directions when we consider the evergreen cone-bearers. How can we lightly sanction their destruction, or even their injury?

Now that we have established some of the important points regarding these trees, let us see how their prosperity is being threatened. We cannot here deal with the ruthless harvesting of reserves built up before our continent was settled, or discuss the

BLUE SPRUCE

RED CEDAR

REDWOOD

HEMLOCK

enormous destructiveness of fire. But there are some little details about these trees that everyone who collects Christmas greens should know.

Consider what happens if one cuts off the top of an evergreen cone-bearer for a Christmas tree. All trees of this group will not react similarly, but if some of our spruces—like the Norway spruce—are so treated, one or more of the uppermost branches may become a leader. If only one, eventually there might even be a new straight trunk. If two or more leaders get started, there might be a much-forked trunk that would make the tree less useful for lumber. The lesson is that if you take the top from one of these trees it is best to trim the stub snug to the remaining uppermost branch, and remove other branches of the uppermost whorl. In doing this, you will at least give the tree the chance to make some recovery. Ordinarily, there is no excuse for taking the top out of an evergreen so situated that it might produce a useful timber tree.

If you must collect branches and other "greens" from a growing evergreen for decoration, take them from parts of the tree where the general form will not be affected. If you cut off branches, trim them back snugly and neatly close to the trunk so that no dead stub is left. Do not break off the branches, leaving ragged stubs, but cut them clean with pruning shears, a knife, hatchet or saw. Do not remove all of the lower branches of such evergreens as the spruces, because they serve a useful function. If you want to encourage the quick development of symmetric trees in a plantation, keep down the competitive brush and grass, which cuts off light.

Christmas trees and evergreen decorations are, generally speaking, renewable natural resources. You can make the raising of Christmas trees a side-line to the raising of trees for lumber. Christmas tree plantations represent a legitimate hybrid between forestry and agriculture. Christmas trees make splendid crops to raise near large communities on lands too poor to yield profitable agricultural products. In New York State alone, around 275,000 acres of such land are being abandoned by farmers each year; this in an area where shipping rates to the largest centers of population are relatively low, and where the purchasing power of the urban population is relatively high.

SILVER FIR

ARBORVITAE

Raising Christmas trees on a profitable basis, however, does not mean just letting them grow. I had an uncle who did not think of Christmas trees, but thought he could raise chickens by simply turning them out in the yard to hunt grasshoppers. You can raise some chickens and some trees by the Topsy method, but you cannot make a reasonable profit in either line by that way of going about it.

Just as there are several kinds of chickens and cattle and corn, so there are many kinds of Christmas trees. The different kinds vary in market value, in culture, and in their requirements to essential climatic conditions.

Generally speaking, the most valuable species are, in order: Norway spruce, white spruce, balsam fir, Douglas fir, white pine, Scotch pine, red pine, hemlock, white cedar and red cedar. Their value will vary greatly in different sections, and the areas most suitable for each species are considered in the accompanying chart.

The trick in raising chickens is to get them to a marketable size as quickly and as cheaply as possible. The same holds for Christmas trees.

In a Norway spruce, for example, you will see that the branches are arranged in whorls around the central trunk. Each year, the "lead" grows higher into the air from the whorl of branches formed that year. In a Christmas tree, it is desirable that these "stories" of branches be relatively evenly spaced, close enough together and full of intricately-branching green material.

For the first five years after a Norway spruce seedling is planted, it grows slowly. In this period the foundation for a Christmas tree is being established. (Continued on page 536)

COMMON NAME SCIENTIFIC NAME	WHITE PINE *Pinus strobus*	PITCH PINE *Pinus rigida*	RED PINE *Pinus resinosa*	LONGLEAF PINE *Pinus palustris*
DESCRIPTION	Tree, to 220 feet. Trunk, in forests, tall, straight and rarely to 6 feet in diameter. In field, a rather loose, open tree with graceful partly drooping branch-tips. Bark, with shallow, broad-topped ridges, to 2 inches thick. Leaves, normally in clusters of 5 needles, each 3 to 5 inches long and soft, blue-green. Twigs, smooth or hairy, fragrant, flexible, resinous.	Tree, to 80 feet. Trunk, rugged, to 4 feet in diameter, bearing horizontal, cone-crowded branches. Bark, very rough, dark, and broken into irregular fissures that expose the plate-like, dark brown to purplish scales. Leaves, in threes, relatively slender, and often twisted, 2 to 5 inches long, frequently yellowish green, scraggly.	Tree, to 100 feet. Trunk, straight, tall, to 3 feet through. Branches, stout. Crown, broad, open. Bark, greenish brown, shallowly fissured into broad, flat plates. Leaves, in clusters of twos, 4 to 6 inches long, dark green, flexible, persistent 3 to 5 years. Lateral roots, stout, rapid growing, making tree wind-firm.	Tree, to 120 feet. Trunk, tall, straight, tapering, to 3 feet in diameter, with stout, gnarled, twisted branches. Bark, to ½ inch thick, light orange-brown, with thin, papery scales, closely appressed except at the very surface. Leaves, dark green, in clusters of 3, to 18 inches long, dropping at end of second year.
RANGE AND HABITAT	Newfoundland to Manitoba and south through northern United States and to Georgia in the Alleghanies. The greatest stands of this tree were in the states bordering the Great Lakes. It is replaced in the west by *Pinus monticola,* which ranges through the Columbia River valley in British Columbia south to California. White Pine is at home on the dryer levels and hillsides.	Relatively common on sandy or barren soil from New Brunswick to Lake Ontario and south to northern Georgia and eastern Tennessee. It is sometimes found in cold, deep swamps but does better on exposed rugged terrain, frequently along coasts of either fresh or salt waters.	On gravélly ridges to dry, sandy plains. Essentially northern. Nova Scotia and Quebec, south to Pennsylvania and west to Minnesota. Locally common. A rather beautiful tree, particularly where it grows in pure stands, and towers to great heights, with uniform, straight trunks.	In areas of sand and gravel, from Virginia to Texas, south through Florida, but mostly in a belt about 125 miles wide from southern Virginia to northern Florida, west to eastern Texas and northern Louisiana. Western yellow pine, *P. ponderosa,* a 3-needled pine ranging from British Columbia to Mexico and east to South Dakota, is also known as longleaf pine.
REPRODUCTION	Staminate cones, bright yellow, appear in late spring in crowded clusters near twig tips just behind new leaves. Seed-bearing 5-11-inch cones free seeds about the second September, though they are mature size in July. Seeds, winged, with 75 to 90 percent normal germination, narrowed at ends, ¼ inch long, ¼ length of wing, red-brown, black mottled.	Staminate cones, in clusters, yellow-purple. Pistillate cones, clustered or raised on short, stout stems, light-green to purple, developing into stout, persistent cones, 1 to 3½ inches long, mature second fall but remain on tree indefinitely after triangular ¼-inch with ¾-inch winged seeds are shed, 68,200 seeds per pound, with 70 to 80% germination.	Cones, staminate, ½ inch long, clustered; pistillate, whorled, short-stalked, scarlet. Pollen shed, May. Mature cones, conical, closed, with unarmed scales, shedding seeds second autumn. Collect seeds September to October, 61,400 per pound, germination 70 to 80 percent. Wind and squirrels spread seeds.	New cones appear in early spring in axils of the new leaves; staminate, in dark, rose-purple clusters; pistillate, appearing just below tip of new shoot, in 2s, 3s or 4s, are also dark purple, but develop into 6- to 10-inch cones, with thin, flat scales bearing ½-inch, ridged, triangular, thin-shelled seeds, on wings 1¾ inches long and ½ inch wide.
WOOD AND ENEMIES	Wood, light, relatively weak, white, uniform, straight-grained, easily worked, and ideal for cabinet work, shingles and walls, masts, and woodenware. White pine blister-rust, with intermediate host on currant and gooseberry, is a serious fungus pest. Beetles attack leading shoot, deforming tree, and injuring it for lumber.	Wood, brittle, 32 pounds per cubic foot, light, soft, coarse-grained, durable, light brown to red, not strong, with sapwood that is thick, yellow or white and relatively soft. A southern variety or hybrid, *P. rigida serotina,* pond pine or marsh pine, is found on wetter grounds such as sand flats, or even peat swamps.	Remarkably free of insect and fungus enemies. Wood, resinous, light, hard, close-grained, pale red, weighs 30.3 pounds per square foot. Twigs, stout, light reddish brown, not downy, roughened near end of each year's growth by leaf-stalks. Seedlings, 1¼ inches high at end of 1st year, with 6-7 cotyledons.	Wood, heavy, hard, durable, pale red to orange, strong, tough, coarse-grained, with winter and summer wood sharply contrasted in color, making the wood look streaked. Sapwood, thin and nearly white, this being useful in making paper pulp. The tree is rich in resins but when old is able to resist grass fires remarkably well.
ECONOMIC IMPORTANCE	One of most valuable trees, the basis of much early prosperity of Great Lakes region; has been planted extensively but now less than formerly because of blister-rust. A clean stand is beautiful but supports little wildlife. Leaves are mildly poisonous to cattle that may eat them. An old tree is a thing of beauty even if it be deformed.	Used as a tree for poor soils, is able to resist fire well and yields wood good for firewood, excellent for charcoal and sometimes suitable for sawing into lumber for coarse construction work. An old tree, with its gnarled, horizontal branches and persistent cones, has a unique beauty.	Valuable timber tree, used in heavy construction, for piles and masts, a good substitute for white pine. Bark sometimes used for tanning leather. Often planted in parks as ornamentals and probably is the most desirable for ornament of all the pitch pines of northern range.	Used in making masts, bridges, railway ties, flooring, buildings, fuel, charcoal and in general heavy construction. Trees to 20 years old useful for paper pulp, rayon and other cellulose materials. Probably yields the bulk of the paints and naval stores used in the world. Important source of turpentine.

LODGEPOLE PINE *Pinus contorta murrayana*	AUSTRIAN PINE *Pinus nigra*	SCOTCH PINE *Pinus sylvestris*	MUGHO PINE *Pinus mugo*	RED SPRUCE *Picea rubens*
Tree, to 150 feet. Trunk to 3 feet through or rarely 6 feet. Branches, slender, much forked, light orange when young and tending to droop. Crown, pyramidal to spire-shaped. Leaves, in twos, about 2 inches long but may be 3 inches, and around ⅛ inch through, yellow green, giving the tree a light appearance.	Tree, to 150 feet. Pyramidal when young, but flat-topped when old, with upward bending, coarse branches that are relatively stiff. Branchlets, light brown, coarsely roughened. Buds, light brown, resinous. Leaves, in twos, stiff, coarse, to 7 inches long, dark green, sometimes slightly twisted, persist about 6 or more years.	Tree, to 40 feet, but normally not high. Crown, pyramidal when young, but irregular when old. Bark, reddish, red-brown, with thin areas above, and dark, thicker areas below. Branchlets, dull, gray to yellow. Leaves, in twos, usually twisted, to 3 inches long, bluish green, rather slender. Buds, resinous, brown, oval.	Usually low, spreading or even prostrate tree, with many branches close to the ground and rarely reaching to greater height than 40 feet. Many forms are modified by the surrounding topography. Branchlets, brown. Bark, dark, rough, and peeling off in flakes. Leaves, in 2s, crowded, stout, to 3½ inches long, bright green.	Tree, to 100 feet. Tall, narrow, conical, with branches clear to ground in the open, or absent when crowded in forest. Trunk, to 3 feet through. Bark, to ½ inch thick, with appressed, irregular, red-brown scales. Leaves, about ½ inch long, green, square, sharp-tipped, alternate. Twigs, brown, hairy, roughened. Buds, red-brown.
Commonest cone-bearer in northern Rockies, forming much of forest at lower altitudes. Ranges from the Yukon south to Lower California (7,000 to 10,000 ft.). Common tree through eastern Washington and Oregon, through the Yellowstone, and to Wyoming and Colorado.	Native of central and southern Europe and Asia Minor with many varieties, with rather definite geographic limitations. Variety *austriaca* is the commonly planted ornamental in America. It has slightly shorter leaves than the typical species. Other varieties include Crimean, Prostrate, Corsican and so on.	Native of Europe and Siberia, where it has long been under cultivation. Rather extensively planted as a forest tree in early-American forestry practice, but now not used to so great an extent. A great variety of forms characteristic of different areas within the range of the species.	Native of the mountainous areas of central and southern Europe. Four major varieties are recognized, a compact form, *compacta;* a conical form, *rotundata;* a prostrate form, *mughus;* and an oblique, unsymmetrical form, *rostrata.* Other varieties are based on other characters of the leaves, cones and color.	Dry hillsides and slopes, often being very common. From the St. Lawrence River and Prince Edward Island south to Massachusetts coast, inner New England, and south along the Appalachian highlands to West Virginia, Tennessee and North Carolina, at elevations above 2,500 feet. Sometimes found planted as an ornamental.
P. contorta (close to coast) has bases of cones more oblique than in *murrayana.* Cones about 2 inches long; may remain closed with seeds still vital as long as 20 years, or may open and free seeds as soon as they reach mature size.	Cones, borne near base of new growth of the year, the staminate leaving a relatively bare area when they are shed. Typical cones are to 3 inches long, opening to free winged seeds, with opened scales bent far back, usually yellow brown but darker in the interior and slightly varnished on outside, attractive for ornamental purposes.	Cones, short-stalked, gray, to red-brown, 1½ to 2½ inches long. Seed, dark gray, ⅛ inch long, ripening in early autumn, mottled, 68,400 to a pound, with 70 to 80 percent germination; should be collected from October to March and stored in bottles or bags in a cool, dry place until ready for planting in seed bed.	Young cones, usually tawny-yellow, or dark brown and shiny; ripen into cones of varying length; in *rostrata,* they are about 2½ inches long, while in some others they are smaller. Varieties and some closely related species frequently cross, so hybrids are abundant and identification is not always easy or accurate.	Cones, staminate, small, oval, bright red; pistillate, oblong cylinders, developing, on short downward curving stalks, into 2-inch cones, with entire or notched scales; cones shed relatively soon after reaching maturity, unlike the black spruce in which they persist for many years. Seeds, 131,400 per pound, with 50 to 60% germination.
Wood, light, weak, soft, close, straight-grained, light yellow, not durable, with thin, lighter colored sapwood. Probably at its best in Sierra Nevadas of eastern Washington and Oregon and northern California, at elevations between 8,000 and 9,500 feet.	Wood, relatively uniform, light colored, highly resinous, rather fast growing. Relatively free from disease, and when grown with others of its kind makes a dense, dark background useful in establishing windbreaks and in providing a reasonable amount of shelter for wildlife.	This is the most important timber tree of Europe. Varieties include slim, tall, red-barked *rigensis;* yellow-coned, slender, pyramidal, broader-leaved *lapponica;* gray-green, thick, stiff-leaved, oblique-coned *engadensis;* columnar, upward-reaching branched *fastigata;* light, silver-blue-green-leaved *argentea.*	Probably the prostrate form makes it possible for this species to survive on snow-covered mountains, where larger, more erect species could not continue to exist. Except as bizarre ornamentals, the species probably has little commercial value, but landscape gardeners find in it excellent opportunities.	Wood, light, soft, pale, weak, close-grained, tinged with red, but with paler sapwood, which is usually about 2 inches thick. Among its enemies are a leaf blister-rust, a twig blight, and pecky wood-rot. For nurseries, the seeds are collected with the cones in October and November, and are stored in a cool, dry place.
The wood is used for fuel, in rough construction work in mines, as railroad ties, sometimes as lumber, and as frames for farm buildings. The tree serves as a ground cover in areas where other trees do not seem to thrive.	Used in America largely as ornamental and windbreak; in Europe, is important timber tree. Variety *austriaca* is more hardy farther north than most other varieties, though most of them can survive as far north as Massachusetts. Possibly trees are more beautiful as young plants than when mature and this enhances their use as ornamentals.	In Europe, it is a timber tree; in America its greatest use is as a quickly-growing cover species, and a soil anchor. It is relatively free from some common fungus pests, but commonly is too irregular in shape to yield good timber, although it does yield a quick crop of firewood.	As suggested above, the major value of this species lies in its use in landscaping. The wood probably would be useful as firewood in areas where other species could not survive but its commercial value for that purpose would be relatively low, because of its slow growth.	An important timber tree in the Northeast, producing lumber for flooring, veneer, house construction, sounding boards in musical instruments, paper pulp. In World War I, was important in airplane construction. Tree yields spruce gum of commerce and twigs yield spruce beer. Too slow-growing for reforestation use.

COMMON NAME SCIENTIFIC NAME	BLUE SPRUCE *Picea pungens*	NORWAY SPRUCE *Picea excelsa*	BALSAM FIR *Abies balsamea*	SILVER FIR *Abies concolor*
DESCRIPTION	Tree, to 150 feet. Trunk, to 3 feet in diameter, but frequently branched into more than one, relatively low, with stiff, horizontal branches that curve upward near tips. Twigs, roughened by leaf bases. Leaves, square in cross section, stiff, sharply pointed, to 1⅛ inches long, dull, blue-green, after 3 or 4 years; lighter, earlier.	Tree, to 150 feet. Straight, cone-shaped, with branches in whorls extending horizontally from trunk and rising at tips, but with numerous short branchlets hanging from them. Twigs, hairy, or smooth, brown. Buds, with overlapping pointed scales. Old bark, with large, thick, flaky scales. Leaves, to 1 inch long, sharp-pointed, 4-sided, stalkless.	Tree, to 60 feet, although at high altitudes may be merely a low shrub. Trunk, may be to 2 feet in diameter. Old bark, scaly, and spotted with resinous blisters. Twigs, smooth, with needle scars scarcely, if at all, raised. Leaves, flat, blunt, narrow needles, ½ to 1½ inches long, without definite stalks. Buds, blunt, resinous.	Tree, to 250 feet; inland from west coast, rarely exceeds 125 feet. Trunk, to 6 feet in diameter. Bark, to 6 inches thick; on old trees, divided into broad, rounded ridges, exposing plate-like scales between. Twigs, relatively smooth and rubbery. Leaves, flat, slender, crowded, pale blue, to 3 inches long, blunt, dull green, after 2 years.
RANGE AND HABITAT	Favors stream banks but forms important part of cover in Wyoming. Ranges from Colorado, Wyoming and Utah south to northern New Mexico. Planted extensively as an ornamental, particularly in some horticultural forms, which are grafted. Normally found wild between 6,500- and 11,000-foot elevation.	Grown along roadsides and near buildings. Especially abundant in Norway but widely cultivated from Maine to Washington, D. C. and west to Kansas. It was the tree that most farmers of Civil War times planted about their homes for windbreaks and for decoration after they had cut down the native species.	Varyingly common in damp woods and swamps from Newfoundland and along the highlands to Virginia, west to Iowa and north and west far into Canada. It is sometimes planted as an ornamental but is not generally so successful as other species of firs or so hardy as many other conifers that are equally attractive.	In mountains, from southern Colorado west to the ranges of California, north to northern Oregon, and south to New Mexico, northern Mexico and Lower California. It is a dominant tree in the forests in the mountains of southern California. It is grown as an ornamental widely through the East, and in western Europe.
REPRODUCTION	Staminate cones, yellow, with a tinge of red; pistillate, pale green, with broad scales, developing into 3-inch cones that are found almost exclusively in upper third of the tree and are green with a red tinge, and reach full growth by midsummer. Seeds, ⅛ inch long, with wings twice that length.	Staminate cones, among leaves of last year's growth; pistillate, on upper sides of newer branches, at first erect, but when mature during first year, they droop in great clusters. At maturity, cones may be about 6 or 7 inches long, compact. Seedlings, 2 inches tall, with about 4 medium-broad seed-leaves. Pollination, May; fertilization, June.	Cones, erect, the staminate yellow, tinged with reddish purple, among the leaves of preceding year; pistillate, with round, purple scales, with pale green bracts, and developing into 4-inch cones, that shed their scales and seeds, leaving erect cores. Seeds, 43,800 to pound, with 40 to 60 percent germination.	Staminate cones, rose to dark red; pistillate, erect, with broad, round scales, developing into mature cones up to 5 inches long, and only slightly narrowed from the middle to the ends. Cone scales, shed, freeing the ½-inch dark brown, shining, rose-winged seeds, the wings finally changing to a gray-brown.
WOOD AND ENEMIES	Wood, light, weak, soft, pale brown, to white, with negligible sapwood, close-grained and relatively easily worked. The loss of lower branches as tree matures makes it unsightly, particularly if it is grown near other trees, but, in youth, trees are most attractive in form and in color.	Wood, white, soft, brittle, very weak, 23.8 pounds per cubic foot. More than 30 horticultural varieties recognized, these varying in size, form, and color, as well as in nature of leaves, twigs, branches and cones, some being merely prostrate plants, with little or no erect trunk, while others are tall, stately trees.	Wood, white, weak, soft, brittle, 23.8 pounds to the cubic foot, weathers poorly, coarse grained, pale brown to white, with brown streaks and a thick, lighter-colored sapwood. The tree is clean, and symmetrical in form, and makes an ideal Christmas decoration because the needles are rather long persistent.	Wood, light, weak, not durable, coarse-grained, pale brown to white, soft and generally poor, but easily made into weak boxes. This is the big tree of parts of its range, and is the only fir to be found in the Great Basin in New Mexico and Arizona, where it grows in surprisingly dry areas.
ECONOMIC IMPORTANCE	The wood has no special uses and is not superior to that of most other spruces, but the tree is one of the best of the ornamental evergreens and has gained a wide and deserved popularity. It has found favor in Europe as well as in eastern United States for this purpose.	Wood used in cars, spars, masts, paper pulp, baskets, rough construction where great strength is not needed. Trees may grow well and quickly in swampy areas. Relatively few enemies, a bud gall and a few fungi being the worst. These are rarely epidemic, and some may remain confined to an individual tree among many for years.	Wood used for making weak, poor packing cases, and in making paper pulp. The bark yields the oil of balsam used in medicine and in the arts. Oil is commonly used to cement lenses together, to hold coverglasses on microscope slides, and for a variety of other purposes.	A beautiful ornamental tree, grown rather extensively for that purpose. The wood is useful only in making such things as cheap packing cases, although it has been used in making butter tubs, and other wooden containers that do not require great strength.

DOUGLAS FIR *Pseudotsuga taxifolia*	HEMLOCK *Tsuga canadensis*	RED CEDAR *Juniperus virginiana*	ARBORVITAE *Thuja occidentalis*	(1) BIG TREE, (2) REDWOOD SEQUOIA *(1) gigantea* *(2) sempervirens*
Tree, to over 200 feet. Trunk, tall, straight, to 12 feet in diameter. Bark, on young trees, smooth, thin, gray; on old trees, to 1 foot thick, broken into oblong plates or great rounded ridges, with the outer surfaces showing appressed scales. Buds, pointed, ¼-inch long. Leaves, flat, pointed, to 1¼ inches long by 1/16 wide.	Tree, to 100 feet, tall, straight, pyramid-like, variable in form. Trunk, to 4 feet in diameter, gradually tapering. Bark, to ¾ inch thick, deeply cut, with narrow grooves and rounded somewhat scaly ridges, dark gray or reddish. Buds, blunt, brown, 1/16 inch long. Leaves, flat, to ⅔ inch long, 1/16 inch wide, with 2 light lines beneath. A sort of "tea" may be made of the leaves.	Tree, to 120 feet. Common as shrub or pyramid-shaped tree, sometimes with many branching trunks rather than single central trunk. Bark, shreddy. Trunk, to 4 feet in diameter. Leaves, mostly opposite, somewhat triangular, with tip free from or pressed to twig, crowded. Twigs, usually 4-sided, with covering of leaves.	Tree, to 70 feet. Cylindrical to cone-shaped, but variously shaped. Trunk, to 5 feet through. Bark, pale, shredding vertically into long strips, free at the ends and curling free from trunk. Leaves, flat, opposite, closely pressed to twigs, alternating with pairs of folded needles, also closely pressed to twigs.	Trees, height; (1) to 280 feet; (2) to over 300 feet. Trunk; (1) to 20 feet; (2) to 15 feet. Bark of (1) darker, richer in color; known to resist a 7-day fire of logs. Leaves, (1) scale-like, blue-green, ⅛ to ½ inch, longer leaves on larger twigs, and largest on seedlings; (2) attached singly, flat, to 1 inch long, making flat spray, whitish beneath.
In Rocky Mountains, from latitude 55° north, south to northern Mexico but reaches greatest size in British Columbia, Washington, Oregon region where it is the "big tree". Planted extensively as ornamental through East and in temperate Europe. Has wide range of climatic conditions which it can survive.	Common, mostly on upland ridges or scattered through broad-leaved forests. Very common gorge tree, not common in open. Nova Scotia to Minnesota and south to Alabama and Tennessee. Replaced in the west by three other species, the black or mountain hemlock of the West differing most from *T. canadensis*.	Common on dry hills or, mainly in the south, dense swamps, from Nova Scotia to Ontario and North Dakota, south to Kansas and Florida. It more commonly grows mixed with other species than in pure stands, although pure stands sometimes do occur in limited areas, especially where planted by birds in fields formerly cultivated.	Common, particularly in cool swampy areas, from eastern Quebec to Pennsylvania, along mountains to North Carolina and west to Minnesota and Manitoba. Often forms almost impenetrable forests, usually where there is abundance of ground water; size of trees larger in northern part of range.	(1) Central California, 5,000 to 8,500 foot elevation on west side of the Sierra, usually in restricted groves, often springing from stumps of older trees. (2) From 8 miles north of California line in Oregon, south to Santa Lucia Mountains in Monterey County, in fog belt near ocean, whence the name Coast Redwood; to 2,500 foot elevation.
Staminate cones, orange-red, small; pistillate, slender, with a touch of red, developing into cones, to 6½ inches long, bearing peculiar scales, with longer "cover-scales". Cones hang in attractive clusters and reach maturity by midsummer. Seeds, ¼-inch long, and half as wide, with dark, brown wings that are about ½ inch long.	Staminate cones, small, pale yellow; pistillate, pale green at first, and developing into ¾-inch cones that open late in first winter, and free minute, winged seeds, the wings about twice length of seed. Seeds, 200,000 per pound, with 20 to 30% germination.	Staminate and pistillate cone-like structures are on different trees, clustered near the tips of the twigs. When young, they appear cone-like, but as the pistillate cones mature, they become bluish, berry-like structures, ¼-inch through, each with 1 to 3 seeds. Pollination, in April or May. Mature berries or cones shed after first winter.	New cones start in April and May, form liver-colored cones, the staminate and pistillate being on different branches of the same tree. Mature cones, ½ inch long, with thin, woody scales, and ready by early fall to shed the ⅛ inch seeds, with their thin wings, that are as wide as the seed itself.	Cones (1) to 3¾ inches long, 2¼ inches wide, maturing second summer, freeing ⅛ to ¼ inch seeds, weighing 3,000 to the ounce, only about 1 in one million fertile; (2) to 1 inch long, maturing in one year, 4 or 5 seeds under each cone-scale; borne at the tips of new growth when new, maturing farther back naturally.
Wood, remarkably uniform, light, yellow to red, with white sapwood that varies greatly in depth. Branchlets, pale orange and shining the first season, turning successively red-brown and gray, and are fuzzy for 3 or 4 years. Leaves may persist for as long as 16 years. Bark of old trees resists fire reasonably well.	Wood, light, soft, "brash", with unpleasant smell particularly when wet, splits easily and splinters on weathering, does not work easily, light brown, with a tinge of red, with sapwood, thin and somewhat darker. Cones are shed at end of first year and leaves usually at end of third year.	Heartwood, fragrant, hard, uniform in texture, very durable, 30.7 pounds to cubic foot, red, streaked with yellow or brown, takes brilliant polish, beautiful when varnished. Birds carry seeds. Tree, host of cedar-apple disease, fungus that makes a scab on apples. Bagworms also are pests.	Wood, soft, very durable, brittle, coarse-grained, 19.7 pounds per cubic foot, fragrant, yellowish or pale brown, and relatively easily worked for certain purposes. Seedlings, about 4 inches tall, with spreading, narrow leaves, in 2s and 4s. Nurseries have produced a tremendous number of varying forms.	Wood, (1) very light, soft, not strong, brittle, coarse-grained, darkens with exposure; (2) light, not strong, easily worked and split, durable in soil, lighter in color, soft. Bark of (1) to 2 feet thick, divided into rounded areas to 5 feet wide, separating into scaly areas; of (2) to 1 foot thick, with inner bark bright, cinnamon red.
Wood used for many sorts of construction, for buildings, railway ties, telephone poles, piles and for fuel. It is the "Oregon Pine" of commerce. Bark sometimes used as a source of material for tanning leather, and in the East, the young trees are used for hedges, windbreaks, and just for ornamental purposes. "Tea" made from leaves.	Wood, used for coarse construction, particularly where it will not be exposed to weather. Inner bark has strong astringent qualities, and yielded most of materials formerly used in tanning leather in our Northeast and southern Canada. Whole forests in Adirondacks and New England were cut down for the bark alone. Hemlock oil is extracted from branches.	Wood, most useful in making chests and certain kinds of furniture, for making cedar closets, which are relatively free from moth attacks. Posts, exceptionally durable. Oil from leaves and from wood, used in perfumes and in arts. Decoction of fruits, used as tea and medicinally. Grown as ornamental, but should not be planted near apples. Good fire-wood.	Wood, used as lumber, in making shingles, spools, boats, railroad ties, and for other woodenware. Bark may be shredded for tinder. In an open fire, the wood "spits" sparks and crackles loudly, but is not so dangerous in spreading forest fires as some hardwoods. Extracts from the younger branchlets yield medicinal substances.	(1) Probably lived more than 5,000 years, although none over 4,000 now standing; protected might live 10,000 years. Most famous (1) are General Grant, General Sherman, Boole and Hart. Growth may require 100 years to add 1 inch of new wood. Famous (2) include Mother Tree, Father Tree, Santa Clara Tree in California Redwood Park.

(Continued from page 531) The young tree should be kept free of competition from other trees, grass and fire, otherwise the branches near the ground will die or be poorly developed, and the tree will not be able to fill out normally in later years.

When the root system of a Norway spruce seedling has become well established during about five years, the tree suddenly "comes to life". It puts on growth wherever growth is possible. About four years after this the tree should be in excellent condition for sale. If the seedlings have been set at least six feet from any other seedling, the tree has had at least three feet of "free room" all about it. The larger branches at the bottom of the tree should then be about a yard long—a comfortable distance to use in placing gifts and the usual tinsel ornaments.

The trees should be harvested by cutting as late in the season as is marketably reasonable. About 2000 trees may be planted to an acre. Sold at wholesale, these should bring from five to ten cents apiece, although in some areas they may bring as high as thirty cents each. This should give a good return for a ten-year period for land that otherwise might yield nothing except tax bills. If superior trees can be guaranteed, growers may build up lists of annual customers, thus increasing profits.

A steady market over the years requires that the grower have a steady crop of trees ready for sale. This may be accomplished by planting new areas each year, harvesting the different areas as the trees on them reach a marketable size. It may also be done by selective cutting, taking the largest trees from a plantation in such a way that in about three years a given area has yielded its trees and is ready for replanting.

If an area is planted with the primary purpose of producing timber trees, there is some advantage in crowding the trees to produce straight, uniform trunks. This crowding ruins the form of trees for use as Christmas trees, although table trees up to three feet may be raised in this way without affecting adversely the trees that are to be left for the production of lumber.

The selection of the kinds of trees to be grown for Christmas trees is important. Norway spruce does best on deep moist soils, but will do well on thin soils that are not too sandy or dry. White spruce does better on wetter soils than Norway spruce, but otherwise is managed in much the same way. Balsam fir, one of the prettiest of Christmas tree species, will not grow at all—or will grow too slowly—if planted in most of the areas close to the great centers of population. Besides this, transplanted seedlings of balsam do not survive in as high a percentage as do the spruces mentioned. As is suggested under the section on Scotch pine, it is difficult to get this tree in America to yield high quality timber trees. Yet the trees grow rapidly in areas where ground cover may be essential for the protection of a watershed. The trees may become good marketable Christmas trees, even though they are not likely to grow into superior timber trees.

The market value of a Christmas tree is influenced by its shape, color, size, persistence of its needles, and by other considerations. Some species, such as the hemlocks, do not submit easily to the ordinary cultural methods. Furthermore, hemlocks shed their needles relatively quickly and lack the fragrance associated with balsam or white cedar. They are rarely symmetrical, and, since they normally grow mixed with species of broad-leaved trees, their usefulness as cover for game justifies their protection. Still, if they are found crowded, or likely to become crowded, there is no reason why they should not be harvested selectively.

Trees that are brought into the house for decoration usually begin to dry out rapidly. Some people set the bases in containers of water so that some of the water lost from the tops may be replaced. This is not always so effective in practice as it may be in theory, partly because of the desert-like dryness of the rooms in which we spend so much of our time during the Christmas season.

There are some laws that govern the raising and harvesting of Christmas greens and Christmas trees. In New York State, seedlings may be purchased from the State Conservation Department at reasonable figures, to start plantations. Such trees cannot be resold by the purchaser, nor can they be removed with their roots, once they have been set out. This prevents diversion of State-grown seedlings to dealers in ornamentals.

New York State makes it illegal for anyone at any time to remove from State lands "any plant, shrub, tree or vine", or particularly any mountain laurel. Many New York cities decorate their streets with mountain laurel in the holiday season, but most of this material is imported from outside the State. Other states have other laws protecting some of their plants, but these laws are no guarantee that all of our valuable evergreens will continue to be available for the enjoyment of succeeding generations. Enforcement of such laws is extremely difficult, and the general public is slow to see the necessity of vigilance in such cases, and jealous of a custom so long enjoyed that it is considered as a right.

Substitutes for trees have been developed in many places. Some of these call for the making of wreaths and similar decorations by binding clippings to wire or wooden frames. The original frame is made in the desired form. To this are bound small pieces of greens, bound by continually winding around them thread from a spool. Such wreaths are frequently "pepped up" by adding a few pine cones. Some misguided souls feel that, in spite of Biblical caution about gilding the lily, our native pine cones are more attractive if sprayed with gilt or silver paint.

Christmas wreaths of evergreens are sometimes enlivened by adding fresh fruits. If these can give color to an otherwise drab bit of ornamentation, the practice should be encouraged, if for no other reason than that it will relieve the drain on native species. Brightly-colored ribbons, sleigh-bells, tissue paper and colored cellophane, all aid in making attractive wreaths of greens from trimmings that may be taken without serious injury to growing trees.

The Christmas season is one in which most of us enjoy doing things for others; in making ourselves happy by making others happy. The taking of trees from lands owned by others is foreign to the Christmas spirit. No doubt many such practices are thoughtless. They can be avoided by a program that reduces the cost of trees and other greens to such a point that there is no inducement to get these decorations through questionable channels. It is possible that in many municipal plantations surplus evergreens could easily be harvested by children under the direction of those who understand which plants could be removed. This might provide children with the fun of getting their own trees. It might provide the necessary labor for judicious thinning at no expense. There is little doubt but that such a solution would bring a satisfying reaction to the man with the "little round belly that shook when he laughed like a bowlful of jelly," for surely his philosophy of life must be founded on the principle of the Golden Rule.

As We See It

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Full Speed Ahead on the Everglades

In our great National Parks of the West we have preserved mountains, glaciers, canyons, forests and other scenic and geological wonders. Through creation of many National Monuments we have set aside lesser areas, important historically, ecologically or for other reasons that make such reservations unique. In the East we have made a National Park of typical Maine coastal country, and have thrown the protection of a park status about the Great Smokies of Tennessee and North Carolina. Yet there is one National Park task that is still uncompleted—one that richly deserves completion without delay. That task is the creation of the Everglades National Park in Florida.

One of the objectives of the National Park program is to preserve for posterity outstanding typical areas. With minor exception, the areas thus far set aside meet this requirement. They cannot, however, be truly representative as a whole of "outstanding typical areas" until the Everglades are secure against the destructive results of commercial development.

Creation of this park will preserve a typical area of sub-tropical United States. It will save lands rich in flora and in wildlife associations. More than that, since the Congressional Enabling Act provides for a liberal area of Atlantic tropical waters, it will save a water-world that is both unique and important. This phase of the Everglades project has not been enough considered. As Ernest F. Coe, Director of the Everglades Association, well says: "Within the ocean waters is the cradle of life of this planet. . . Fortunate indeed is America, in that included within the area authorized for the Everglades National Park, is this Atlantic Ocean section, wherein is located one of the world's most representative examples of life characteristic of tropic ocean waters."

The Everglades project is no new idea. It was launched in the late twenties, and the Everglades National Park Association, which has been the spearhead of the campaign, was established in 1929. Thorough studies of the area have been made. The boundaries have been carefully considered.

When a National Park is to be created by setting aside land already exclusively or largely in public ownership relatively few problems are involved. But where the land involves private ownership, or state or county lands, the problem is not so simple. Titles to the lands within the area must be acquired by the State, so that when the park is handed over to the National Park Service it is a legal and physical entity.

The initiative now rests with the State of Florida, whose Governor, Spessard L. Holland, is an active supporter of the project. However, whether by virtue of preoccupation with the war, or a feeling that this is not the best time to proceed, activity seems to have lagged. In our opinion this is an admirable time to carry the project to a successful conclusion. Wartime is a reason for doing so, rather than an excuse for inactivity. When men are fighting and dying for their country is certainly a proper time to act for the benefit of that country and its posterity.

The next necessary steps are not difficult to take. The State Legislature has authorized a Park area of two thousand square miles. It has set up an Everglades National Park Commission, to which temporary title to lands may be transfered. Some five hundred square miles now in State ownership need only to be officially designated for park purposes. Another two hundred and fifty square miles of now privately-owned land can be obtained by exchange of State-owned land outside the proposed park boundaries. It is believed that enough land to bring the total to one thousand square miles may be obtained by contributions of land. The balance must be acquired by purchase through a publicly-subscribed fund.

All, then, that is now needed to carry the project rapidly to a point of real accomplishment is leadership by Governor Holland. Aggressive action by the State of Florida to make as much as one-half of the area legally available would set the stage for a successful launching of a drive for the remaining necessary funds. It would now seem to be up to Governor Holland, and his administration, to see that Florida has a National Park of outstanding value. If we may judge by his excellent and progressive administration, it is an opportunity that he will not overlook.

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Nature in Print

By HOWARD ZAHNISER

It is not long since those concerned with the values represented by the general term Nature had a profound fear that public interest would be so centered in special wartime activities that no longer would the appreciation of living resources continue to increase. So far, however, there have been many indications that the emergencies of war have actually been accompanied by an even greater concern with these values than many Americans knew during years of peace. Fears recognized and expressed often do have a way of preventing the developments they seem to be preceding, and there is still no doubt that the vigilance these fears have represented is a public virtue. Yet, now that the Nation has actually lived at war for two years, it is easy to see why the patriotism war heightens should result in a better love of the land itself and why many citizens should seek to understand more fully the natural foundations of national welfare. Present conditions, while not entirely dispelling fears of neglect and destructive exploitation, do thus afford an excellent opportunity for increasing the knowledge upon which prudent attitudes toward natural resources depend.

This opportunity has been realized effectively in one way by Hermann R. Muelder and David M. Delo in *Years of This Land: A Geographical History of the United States.* It has been realized in another way by William R. Van Dersal in *The American Land: Its History and Its Uses.* Donald Culross Peattie has also sensed this opportunity in *Journey into America.*

Mr. Peattie's eloquence, it is true, is now inspired by other American glories than those of the living world of the outdoors, which once seemed his peculiar sources of enthusiasm; but, as though fulfilling the prophecies of many advocates of the outdoors as a school for patriotism, Mr. Peattie's celebration of his national heroes, heroines, and interpretations of history does seem the more spirited because he has so long and so affectionately studied the landscape of America. His new book is creative folklore—Mr. Peattie's own American sagas sung in poetic prose as variations on the themes of history. So successfully creative are they that in all probability only confident historians could tell how different the variations are from the factual themes, and only musicians who know the possibilities of such an art can appreciate fully his achievements.

Tom Paine, Tom Jefferson, George Washington, Dan'l Boone, Jim Bridger, Kit Carson, Abe Lincoln, John Woodhouse Audubon—and Mary Washington, Jemima Boone, Clara Barton, and Narcissa Whitman—are very much alive in the America into which Mr. Peattie journeys, but whether they lived precisely the same lives in the America they themselves knew is perhaps another question. It may not matter, and yet when Mr. Peattie brings Narcissa Whitman to life as a "childless woman" and as vividly allows her to relive in the next chapter the same days as an expectant mother, there do arise questions as to the responsibilities of creative writing. They are rather grave questions for a writer so persuasive as Mr. Peattie. For example, is it right even with fair warning to use the true name of Narcissa Whitman for a fictional character who took from Jim Bridger the fictional lad who read to the illiterate pioneer from Shakespeare? I trust that none of Mr. Peattie's unlabeled variations are so creative, for I know that the Narcissa Whitman who will now most vividly live in my own memory is the compassionate transient in Jim Bridger's cabin that only Mr. Peattie created.

Yet *Journey into America* is excellent for live reading, and does testify to the influence of a love of the land, for it was indeed written after a journey—"a skimming look at the land, tracing, mile by mile, farm by farm, town by town, its grand, plain, enduring features.

"I saw the winter wheat growing so fast the Kansas wind whistled in astonishment; the meadowlarks were jingling a pocketful of golden song about it, all along the way. . . . Yes, and I saw the forests of this continent, still the greatest timber reserve in the world, from the southern pines, through the hardwoods of the Middle West, to the redwoods of this coast."

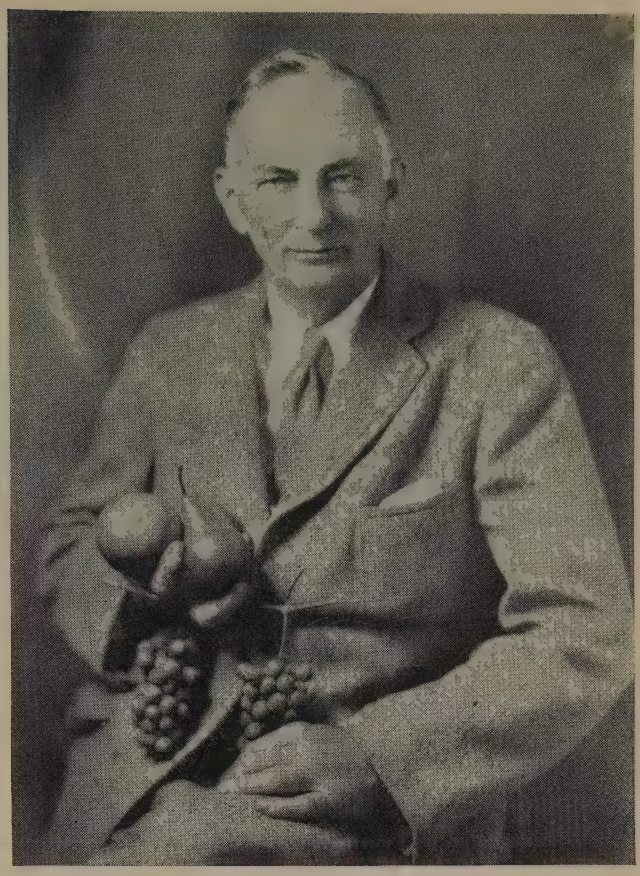
It is a different sort of eloquence with which Dr. Van Dersal has written *The American Land*—the eloquence of facts and photographs, accumulated, organized, and presented fact upon fact, picture after picture, until the total is amazingly inspiring.

"Spread out on the land of the United States," says Dr. Van Dersal—himself inspired with his own accounts of the things that grow on this land—"is the story of a great nation, of its people, of their goings and comings, their food, their dress, their attitude of mind, their ways of living. The deceivingly simple arrangement of farm fields, (Continued on page 550)

Johnny Appleseed Award aptly presented to—

Henry Hicks, Missionary

By ANDREW S. WING



Henry Hicks, head of the outstanding Long Island nursery company, is more than just a commercial grower and seller of trees. He is a crusader for new and better plants for American gardens.

WHEN the Men's Garden Clubs of America recently presented the Johnny Appleseed Award to Henry Hicks, there was wide approval from gardeners and plantsmen everywhere. This was a tribute to a man who is head of one of America's oldest and finest nurseries. Yet this gentle, generous, imaginative Quaker is much more than just a commercial grower and seller of trees.

"Mr. Henry Hicks, as botanist, plant ecologist and nurseryman, has for more than fifty years striven for and promoted more and better gardens," cited E. L. D. Seymour, in making the award. "Modest, self-effacing, simple in character and manner, Henry Hicks is a peculiarly accurate, thoroughgoing exemplification of the Johnny Appleseed attributes: The love of plants and the desire to share that love with others; the unceasing urge to beautify and make more fruitful both the countryside and the homes of the people, and to inspire and help others to do the same; indifference to personal comfort, advantage and prestige; unselfishness, patriotism, service to humanity, practical Christianity."

This is quite an eulogy, repeated here because it is so richly deserved.

When we were busy organizing the Conference on Home Food Conservation in New York last summer, I had a telephone call. An unfamiliar voice said, "This is Henry Hicks. I'd like to bring in a little exhibit of food plants."

"Certainly, Mr. Hicks, bring them right in," I said.

The exhibit turned out to include a wide variety of unusual wild and cultivated berries, nuts and fruits that will grow in the northeastern region. There was everything from pokeweed to ground nuts —the "sag" of the Long Island Indians from which Sag Harbor was named. Many of the plants were new and strange to conference delegates, while others, more familiar, had never been regarded as edible. There were a few who could see no significance in the Hicks collection of "bushes and berries". But Henry Hicks' idea of emphasizing edible plants was a good one—so good that a fascinated Adelaide Hawley gave it high praise in her popular broadcast.

It amuses Henry Hicks to do the unexpected and the unconventional. Yet there are usually sound educational reasons for what he does, and many times his imagination has paid from a business standpoint. Like Johnny Appleseed, he scatters his ideas and his trees, his cuttings and his seeds, wherever he goes. Like that colorful backwoodsman, he is a crusader and a missionary, more interested in ideas than in making money. It is the task of his business associates, several of them of the same name, to keep the wheels turning and the books balanced. His firm has prospered.

The family are Quakers, although Henry says, "The Quakers aren't any better or any worse than any other sect." One of them was president of the railroad that ran from New York to Hicksville, Long Island, the next town east of Westbury. His grandfather, Isaac, turned part of his gravelly farm into a nursery in 1853. Associated with him were two sons, Edward (Henry's father) and Gilbert. The original firm of Isaac Hicks and Sons had 25 acres in trees and shrubs, mostly Norway maples, arborvitae, flowering shrubs and fruit. Today the Hicks nursery covers 350 acres, and is filled with choice species from the Orient and other distant lands, as well as the finest of our hardy native plants.

Henry Hicks was born in 1870. Life as he remembers it as a boy was simple, wholesome and good. Long

There is peace and beauty in this formal garden that is planted with materials from the 350-acre nursery founded by the grandfather of Henry Hicks in 1853.

Island was still a farming community. The big estates and the suburban villages had not surrounded the Hicks farms and nursery.

"Mother and grandmother made every effort to see that we were well-fed, warm, well-rested and well-taught," Mr. Hicks relates of his boyhood days. "Grandmother gave me a Barlow knife at the age of three, replacing it each time one was lost. Into our kitchen came good men—hungry from digging trees, milking and haying—to three sound meals a day. Part of my education was a miniature farm, later changed to a flower garden with a boast of no weed over four inches high until August. I learned applied biology from a cosset lamb beside the kitchen stove, or a runt pig or a chilled baby duck. Money earned by hunting eggs and from duck sales provided banking experience.

"The famous editor of the *New York Sun,* Charles A. Dana, had developed an arboretum on an island at Glen Cove, Long Island. This collection was a great mystery and inspiration to me. Dana's gardener was William Falconer, who edited *Gardening* and later went to be park superintendent of Pittsburgh. I now have his two best men, Edwin H. and Pierre J. Costich. While they keep the nursery going, I go off to visit arboretums, meet with garden clubs, and collect seeds."

Henry went to Brooklyn Polytechnic Institute, where his father had taught, and kindly, gray-haired men teachers let him write compositions on skunks and crows. He spent Saturday afternoons hunting tadpoles, and Sunday afternoons were for studying the blood circulation in their tails with Uncle John's microscope, or reading his Darwin books, or Burroughs or Agassiz. He has always been interested in education and has been a member of the local school board and of the School of Agriculture at Farmingdale for many years. No doubt this interest derives in part from his own unusual and happy boyhood.

"Liberty Hyde Bailey came to Cornell when I did, in 1888," he continues, "he as a teacher, I as a student. He encouraged me to make an herbarium of material from several nurseries and from Dana's Arboretum and the Arnold Arboretum in Boston. It was then that I started begging cuttings of new plants, or borrowing them and explaining about it afterwards."

Those who know Henry Hicks well testify that he has probably given away almost as many plants as he has sold. He likes to spread the good things around. His catalogs of thirty or more years ago are fascinating to go through today, and remarkably fresh and attractive. Fine plants such as the yews, which he was boosting then, are comomnly planted today. He has always been willing and eager to help a new gardener or a strugging new nurseryman.

"Gardeners are lonesome souls and appreciate recognition of their work," he told the Men's Garden Club of New York in his speech accepting their award. "But do not be afraid to be botanists and plant explorers. Study the wild plants that grow nearby and use them in your home plantings. Let us make botany as significant as electrical engineering; plant physiology as important as human physiology; tilling the soil interesting and honorable from age one to one hundred. Let us hold up the ideal of the little farm, well-tilled. Farmers never object to more farmers. Nor will nurserymen object to more nurserymen of the type you can be if you carry out your convictions. What nurserymen need is landscape gardeners who will teach what you men have learned as amateurs."

This is Henry Hicks—the teacher, the crusader, the Johnny Appleseed—always searching for newer and better plants that are suited to American conditions. He is a great advocate of naturalistic plantings, and the use of native (Continued on page 552)

Antville Antics

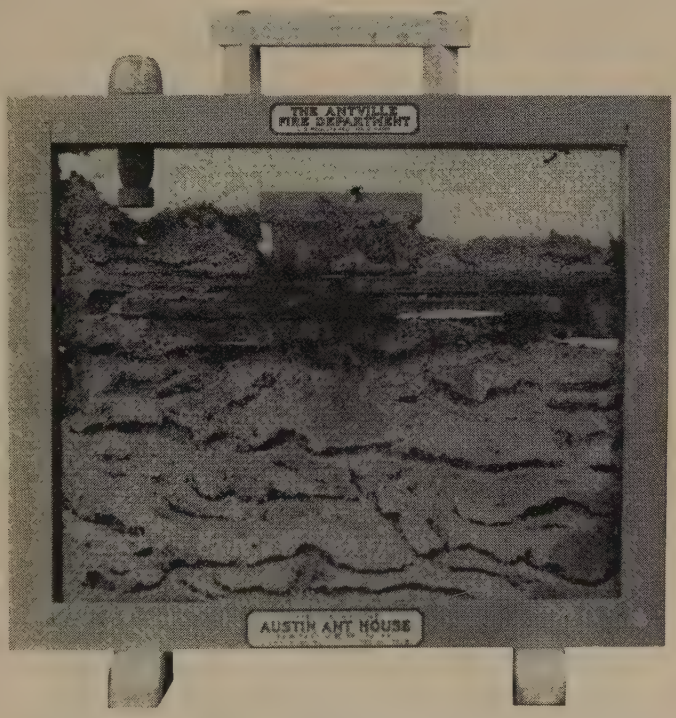
By VIRGINIA H. RANSON

"Go to the ant, thou sluggard. Consider her ways and be wise." King Solomon gave this advice thousands of years ago, but I had the opportunity to act on it only a few months ago. This chance came when my sister in New York sent me a formicary or ant nest. The sales girl from whom she made the purchase was disgusted when she learned that the gift was for neither a child nor an invalid, but for a healthy adult with a case of arrested development.

A card accompanying the formicary called the occupants carpenter ants. They were of several sizes and shapes. There were three large, winged, black and brown ants, the queens. These we named Catherine the Great, Elizabeth, and Maria Theresa. There were a few small, winged, black ants, the worthless kings or drones, and many workers of various sizes and habits. The latter had apparently been assigned special jobs. Some were tunnelers, some guards, some nurses, and others foragers.

When the nest arrived, the first business on the agenda was tunnel-making. While watching this activity I suddenly realized that King Solomon's wisdom had failed him when he said, "Consider her [the ant's] ways and be wise." Anyone would commend ant industry, but their erratic efforts showed as much lack of plan as those of some statesmen. A dozen or so ants would work diligently to excavate a tunnel, laboriously carrying sand, grain by grain, to the surface. Then they would spend the next day carrying the same sand back down to fill up the same excavations. Had this happened only once, we would have explained, "Ah, the intelligent little creatures have admitted they have made a mistake and are trying to rectify it," but it happened frequently. It was reminiscent of the early park-landscaping of the late W.P.A.

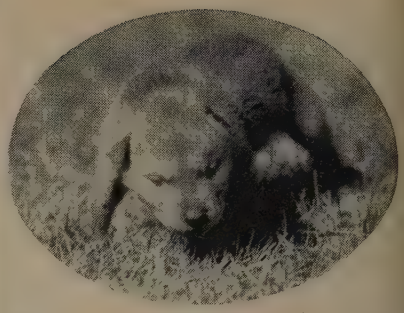
When several tunnels had been dug and living rooms made, some of the workers turned their attention to the queens. The attendants first cut off their majesties' wings. Then, apparently thinking that three queens were too many, they assassinated Maria Theresa. Elizabeth and Catherine soon began to lay minute eggs on top of the Fire House. The ladies-in-waiting all stood around patiently at the royal birthing. As soon as an egg was laid, a "lady" quickly snatched it up and laid it on a pile, which was later carried down into a low room. After several days, the eggs hatched into tiny white larvae. These had to be fed and cared for tenderly. The nurses fed the babies as they did the adults, by regurgitation. Several weeks elapsed. When they had grown to adult size, the larvae spun cocoons about themselves. These cocoons, resembling yellowish grains of rice, are often mistakenly called ant eggs. The time soon came for the coming-out party of the pupae. This caused a great stir in the nest. When the young ants were ready to emerge, one or two nurses selected a pupa-case. They cut open the end and helped to pull out the little one. Alas, probably suffering from some vitamin deficiency, the newcomers were all runts.



In the upper part of the formicary is the whistle, which serves to admit air, as a food tray and to excite the ants. In the center is the red fire house, with front, back and cellar doors, and the ants must go through the house to get to the tunnels below. The roof of the building serves as a community center for everything from child-rearing to tea parties. When the photograph was taken the ants were coy, resenting the lights and most of them hiding in the galleries. Two ants, one of them holding a pupa in its jaws, are on the roof of the fire house. Upper right, are two members of the sanitary department who have been busy with the carcass of a fly. The body has been dragged across the nest and is now ready to be interred.

Observation of the formicary taught me many things about ants. They are extremely clean. After eating and at bedtime they go through a regular clean-up routine. They have a sort of comb on their forelegs with which they curry their antennae. Then they lick themselves all (Continued on page 552)

A pair of young coyotes playing in the yard attracted a legion of visitors, most of them armed with cameras. Marco and Sheba were much photographed.



Marco at a tender puppy age before he had outgrown the bottle. Sheba grew into a beautiful coyote and adopted this attractive pose for photographer William L. Finley.

Marco and Sheba

By JOANNE MURIE

MOTHER and I, tired of waiting for Daddy and my two brothers to arrive, sat down to eat our supper. It was spring in Wyoming and the hills seemed to beckon to adventurers, so we did not expect them home very soon. We had just sat down, however, when they drove into the yard. As they came in the back door I saw them glance at one another and grin. Daddy was carrying his pack-sack and when he came into the room he handed it to me. It felt warm and soft on the bottom and something moved as I held it. I looked inside. There were what looked to me like two tiny puppies. I lifted them out and exclaimed, "Oh, aren't they cute? What are they?"

"They are young coyotes," Daddy answered. "We found them in their den up Cache Creek."

By this time the whole family was "oh-ing" and "ah-ing" over our new pets, and we all began at once to settle the babies in their new home. Immediately after supper, I hurried up town to buy a baby bottle and nipple. Mother fixed up a bushel basket, which we put in one corner of the dining room. That evening we tried to feed them their first meal from the baby bottle, but they would have none of it. We tried various devices and finally succeeded in getting them to take milk from a medicine dropper. After a few "feedings" however, they finally grew accustomed to the bottle.

We three school children were now kept pretty busy. We had to rush home at noon, and again at night, to feed the pups their three ounces of milk. We held them, one at a time, on their backs in our laps, like babies, and it was so funny to watch them. They held the bottle in both front paws and pushed on the nipple. They kicked vigorously with their hind feet, all the while making loud, sucking sounds. We could actually see their little stomachs swell as they drank, until they became as round and hard as a rubber ball.

The roly-poly puppies grew into long-legged, long-eared coyotes. The author holds one of her pets for E. Van Leeuwen to photograph.

We finally decided upon names for our new family. The female we named Sheba because she was the more aggressive of the two and always got what she wanted. We named the male Marco Polo because he was adventurous. Even before his eyes were completely open he would fall out of his bushel-basket bed and go exploring all over the house. Several times we would hear little whimpering noises in the bedroom and there we would find Marco in a far corner

A study in coyote poses. A duet is started by imitating the coyote's call, but otherwise the pets from the wild are interested in the business of photography.

under the bed, tired of exploring and ready to return to his bed and Sheba's company.

One evening when Marco and Sheba were about two weeks old, we sat by the fire listening to rain beating hard against the windows. The lightning flashed at intervals, illuminating the dark room where we sat. The puppies were dozing quietly in their basket in the dining room. It was one of those evenings when people are content to sit by the hearth, cozy and dry, watching the shadows of the flames on the wall. Soon, Marco came toddling into the room and sat down upon the hearth to gaze wonderingly at the dancing flames. Suddenly, as we watched, he raised his tiny nose into the air and began to howl—tiny yapping noises—but unmistakably howling. We looked at each other in amazement. What had stirred his baby soul to answer, at two weeks, the age-old "call of the wild"? Marco was indeed a "wonder-baby."

Several days later, as I was practising on the piano, Marco crawled over the edge of his basket, came over to the piano, sat down at my feet and began to howl. Every day, after that, he would accompany me with his shrill little howls. Occasionally Sheba joined in, from her bed in the corner, but Marco seemed always to be the more musically inclined of the two. Then too, whenever one of us began howling (a poor imitation, but it worked) the pups would join in, working themselves into a frenzy, getting louder and louder until they made quite a noise!

When Marco and Sheba were a few weeks old, my girl friends and I began to use them as dolls. And they loved it! They would lie on their backs in the doll buggy sleeping peacefully, while dressed in layer upon layer of doll clothes—bootees, bonnets, and all.

But of course the time had to come when the roly-poly puppies became long-legged, long-eared coyotes. Their little needle-like teeth became stronger and played havoc with the nipple on their bottle, but they would not need it any longer anyway. When suddenly their legs began to bow and they started walking on their elbows, we decided it was time to change their diet from table scraps to raw meat and cod-liver oil—and it was. They grew rapidly on their meat diet and soon became prick-eared and wary. Now, instead of answering our howling or the piano, they would answer, at night, their relatives who were calling out in the hills.

Such fun as we had with them! Out on hikes in the hills or playing with them in the yard. They became more uneasy while in the house, but were still perfectly friendly and tame. Our yard became a popular place for tourists, who came armed with all kinds of cameras. Marco and Sheba were much photographed.

In the spring of 1940 we found we would have to be away all summer on a trip to the southwest. Of course we could not take Marco and Sheba with us and we did not like to leave them with anyone else, so we turned our little friends loose into their only *real* home—the wilderness. When we took them out of the car and let them go, Sheba did not run off at once, and lingered about, loath to leave. But Marco trotted off into the woods, still looking for adventures; adventures that would test his skill and endurance much more than his babyhood trips to the bedroom.

And now, when we sit by the fire on a rainy evening and hear that familiar call, we like to think "That's another Marco calling to his Sheba." Perhaps it is.

★

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Time given is Standard Time; add one hour for War Time.

The Southern Constellations

By ISABEL M. LEWIS

NEVER before in the history of the world have so many men traveled so rapidly to all corners of the earth as they are doing today; and never have they been more dependent upon navigation by the stars. Within a few days, or even a few hours, an aviator may pass from the northern hemisphere far into the southern hemisphere and see the sky pattern above him change completely. By day he may steer a course by the sun, but to keep on his course by night and reach his destination safely, he must be able to identify certain of the stars above him wherever he may be. In our mid-latitudes of the northern hemisphere it is possible to see stars that lie to some distance south of the celestial equator, but there are many of them that lie far below our southern horizon that we cannot see. Inhabitants of the southern hemisphere face the reverse situation.

At this time of year Fomalhaut, in the constellation of the Southern Fish, appears for a short period above our southern horizon, but soon disappears from view. The aviator who passes from the northern into the southern hemisphere will find this fine first magnitude star rising higher and higher above his southern horizon, while Polaris sinks lower and lower in the northern sky, finally to disappear as he crosses the equator into the southern hemisphere on his route through the sky.

There are several score stars of first and second magnitude known as navigational stars. Although one may get along with thirty or so of these, including all of the twenty brightest stars scattered over the heavens, the more one knows the better. Several of the stars listed among the twenty brightest never rise above the southern horizon in the mid-latitudes of

the northern hemisphere. There is Canopus, the brightest star in the sky next to Sirius. It is in that magnificent constellation of the southern hemisphere known as Argo Navis, which has been divided into three smaller asterisms known as Carina, The Keel; Puppis, The Stern; Vela, The Sail. Canopus is in the Keel and another name for it is Alpha Carinae. It lies about 35 degrees south of Sirius and cannot be seen north of the 37th parallel, but it is visible there just above the southern horizon about nine o'clock in the evening early in February. It is observable to better advantage in Georgia, Florida and the Gulf States for a short time in our winter. As one passes into the southern hemisphere, and it rises high above the horizon, it is a magnificent object.

Achernar, meaning End-of-the-River, is at the southern extremity of the long winding constellation known as Eridanus, The River. It extends from a point in the northern hemisphere, directly west of Rigel, in two streams, one westward to Cetus, the other passing from there to the south, southeast, and then southwest, far into the southern hemisphere in a long line of faint stars, none of them brighter than 3rd magnitude. It reaches its termination in its one brilliant first magnitude star, Achernar, which is also one of the navigational stars. This constellation is the longest in the heavens, even exceeding Hydra in length.

The most brilliant constellation of the southern hemisphere after Argo Navis, although closely rivalled by Scorpio, is Centaurus, The Centaur. This is one of the largest constellations in the heavens, and its center lies about 50 degrees south of Spica, in Virgo. There are only a few stars in this constellation that are visible in the latitude of New York. Alpha Centauri, known also as Rigil Kentaurus, is its brightest star, lying directly in the path of the Milky Way. It is noted for the fact that it is the nearest to the earth of all the first magnitude stars—a distance of 4 1/3 light years. It is a well-known navigational star, lies about 60 degrees south of the celestial equator, crosses the meridian about twenty minutes after Arcturus, but cannot be seen north of the 29th parallel of latitude. Beta Centauri, also a first magnitude star, lies only a few degrees due west of Alpha, or Rigil Kentaurus, and the two form a brilliant pair that reminds us of Castor and Pollux, in Gemini. They are known as the Southern Pointers, that is, pointers to the Southern Cross, which lies embedded in a brilliant portion of the Milky Way about fifteen degrees due west of Beta Centauri and at the edge of that dark region in the Milky Way called The Coal Sack.

The Southern Cross, called also Crux, is the most famous group of stars in the southern hemisphere. The 60th parallel of south latitude passes directly through it and it cannot be seen, completely, north of the 27th parallel of latitude. It is surrounded on three sides by Centaurus and was unknown by its present title in the time of Ptolemy, who considered it as a part of Centaurus. Crux is about six degrees in extent from north to south and less from east to west. Its northernmost star, Gamma, is orange in color and of 1½ magnitude. The other three stars are white. Acrux, the star that with Gamma marks the upright of Crux, is a beautiful double star. Its two components are only five seconds of arc apart and are individually of second magnitude, their combined light being equal to that of a star of first magnitude. Beta and Delta Crucis, which mark the cross-arm of the Southern Cross, are of 1½ and 3rd magnitude respectively. The constellation covers an area in the sky about equal to that of Corvus, which crosses the meridian at the same time and lies about 40 degrees due north. The best time to observe it is in May, as it crosses the meridian at nine o'clock in the evening on May 14. As it is nearly upright at that time, Crux serves as a great timepiece as it advances regularly nearly four minutes a day.

In the southern hemisphere there are twelve constellations listed first by Bayer in his *Uranometria*, published in 1603, that may be said to be "modern" constellations. Designation of these groups is credited by Bayer chiefly to the navigators of the 16th century, but none of the stars is individually named. Most of them are rather inconspicuous. In one instance a second magnitude, navigational star has been given the name of the constellation itself. This star is Alpha Pavonis in the constellation of Pavo, The Peacock. The star is universally known to navigators as Peacock. Among other constellations of the twelve groups are Apus, The Bird of Paradise; Phoenix; Indus, The Indian. These three groups were known to the Chinese as E Cho, The Curious Sparrow, or The Little Wonder Bird, The Fire Bird and the Persian. The con- (Continued on page 551)

In Winter

BY M. L. ALLIS

I like it when the winter's snow
Lies deep upon the knoll;
It brings out every dip and rise,
Outlines each sturdy bole.

When hid by summer's verdure bright,
Or dulled by brown of fall,
We seldom grasp the charm that lies
Beyond the wayside wall.

Now secret places in the wood,
Before so well concealed—
Wee wood-folks' haunts, in thickets close—
Stand everywhere revealed.

Far pleasanter are summer paths
To wander through, I know,
But it is fair to look upon,
A woodland deep in snow.

The School Page

By E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

THE SCHOOL CHRISTMAS TREE

TO MANY a teacher, Christmas is a strenuous part of the year. Children must be drilled in some Christmas play. Gifts are to be expected. Apple-polishing will thrive. And fussy janitors must be handled with gloves if the usual Christmas exercises are to come off without a complete break in some of the more important diplomatic relationships that must be maintained in school. Many of these things center around the Christmas tree. Around it, the children rally for their party. On it, hang the gifts. And beneath it, are scattered the needles and trash that annoy the janitor. Unless its existence can be justified, many teachers will dispense with it, in spite of the fact that it is a symbol of the season to which we all look forward.

One of my most interesting Christmases was spent in Jamaica. My children had expected their Christmas tree even though we were in a hotel. We had it in the lobby, using a palm instead of the usual spruce. We were looked upon as crazy Americans, but years after, we heard from some of those who for the first time that night were handed a little gift direct from the hands of Santa Claus, previously known to them as Father Christmas. That Christmas was one of only two that I have spent outside that belt of North America that boasts such evergreens as fir, hemlock and spruce in reasonable abundance. Those two Christmases made me realize more than ever what these trees mean to us who live in this area.

What are some of the things for which we can use a Christmas tree besides holding Christmas gifts? Can it help in the classes in geography, arithmetic, language, art and science? If so, why let it leave the school room before its usefulness has been explored?

Which Is Which?

The insert in the center of this magazine should give help on the identification of a dozen and a half of the more commonly-used Christmas-tree evergreens. Usually, there are richer references available on the kinds of these trees native in a state. These may most commonly be had from the State Agricultural College, or your State Forester.

To most people, Christmas trees are just "evergreens", or pines, or firs. Did you ever notice that in the pine, needles—with few exceptions—are fastened together in groups? The number in a group on a given tree varies only slightly. Your white pine may not always have five needles in a group, but it usually does. Have you let your children discover what the number is and how great the variation may be? Have you noticed what a great variation there is in the size and shape of the cones of these various trees? And, also, have you noticed how the clusters of leaves on pines are commonly grouped to form what one third-grade youngster called "stories"? The twigs between these stories are relatively bare. Have you asked your children to determine, if possible, why this is so? Some of them may find some of the little staminate cones that earlier in the year crowded these bare areas, and that took the place of the leaves, which persist longer. Once they find this fact, some youngster may make the clever observation that each of these "stories" must have been added a different year. Therefore he can easily and accurately estimate the growth along the twig where the leaves are to be found.

Age of Trees

Once the interest in age has been aroused by the presence of these stories of needles, someone may wonder if the age cannot be determined further by examining the part of the twigs that do not bear leaves. Even a superficial examination will show that after the leaves have been shed, the scars on the twigs persist. Because of this, the age of a twig may be determined. Following this up, one may find that the age of the whole tree may, in some cases, be determined because, in many pines, the branches appear in whorls, each whorl representing a new year's growth. Children once started on this sort of investigation like to find if the tree they have is older or younger than they, and usually the race between a Christmas tree and elementary school children will be relatively close.

A side-line to these studies will include determining who can find the needle that has been longest on the tree studied, and in what year it first appeared. These studies may be carried on with Christmas trees other than pines, of course. The hemlock spray—shown on page 531 of this magazine—shows portions of four years' growth, for example, the different year's growth being separated by the point from which the side branches spring. If you have a hemlock Christmas tree, see how many such series of branches still bear leaves.

While handling these needles on the different kinds of Christmas trees, you may find some that feel soft, some that are stiff and prickly, some that form flat fronds while others form something like a bottle-brush. You may have noticed these differences before, but is this true of your children? If some of the other rooms in your school have Christmas trees, are the trees of the same kinds as yours? Let the children bring slips from the trees at home, and notice what a great variety there is in the kinds. Let some youngster visit a place where Christmas trees are sold and determine whether the different species have equal market value. If they differ, which are the most valuable?

Fir and Fur

It may help you remember some of the commoner kinds of Christmas trees whose needles are borne singly if you learn a few simple things. The true *fir* trees usually feel soft like *fur*. The leaves are blunt-tipped, as are the buds, and even the twigs are soft and relatively smooth. On the other hand the spruces have sharp-pointed needles, sharp-pointed buds and decidedly roughened twigs.

Study of the Christmas evergreens fits into the geography class. In the chart section of the insert you will find the limited geographical distribution of such trees as the sequoias, and how general is that of some of the hemlocks and spruces. Notice how some are so adaptable that they may be grown as ornamentals in various parts of the world; that some trees common locally are valuable as ornamentals in Europe. By the same token, we seem to favor growing Norway spruces in our sideyards and mugho and Austrian pines in our front yards as ornamentals when native

species might do just as well.

Mention of the sequoia brings to mind antiquity in trees, but have you and your children counted the alternating layers of spring and summer wood of a cross-section of wood from some local evergreen? Nothing gives an appreciation of the philosophy of conservation better than seeing that a piece of wood only a few inches across required forty or fifty years or more to complete its growth. Have your children counted these lines in the floor-boards of your school room to see who could find the board with the greatest number in a given inch, or the one that could show the most rapid growth? If you have not tried this, try it.

While looking at wood, particularly that from evergreen trees, notice how it weathers, how the harder summer wood persists longer than the more spongy spring wood. Notice how the wood of some of these trees is distinctly resinous, while that of others is less so, or almost wholly free of resin. What sort of lesson can you get from this as to the role of resins in preventing the disintegration of wood, and the use of resins in keeping the woodwork of ships free from deterioration? If you wish to develop a little patriotism in making these studies, point out how great a proportion of the turpentine and similar materials used in the ships of the world comes from a relatively narrow area in our own southern states.

As suggested in the text of the insert, read Enos Mills' *The Story of a Thousand Year Pine,* and Rupert Brooke's *Pine Tree and the Sky* to yourself and children.

For work in science, notice the influence of evergreen trees on the ground beneath them, caused in part by the continued blocking out of light and by the persistent nature of their leaves. Dig down into the ground and see at what depth you can still find needles whose entity has not been lost by decay. Is this condition the same under broad-leaved trees? Notice a white pine in the rain and the way capillarity brings the needle clusters together, making the whole tree have a bedraggled appearance.

These should be enough leads to convince you that, now that you have that evergreen in your school room for the holiday period, you might as well use it in many ways besides the bearing of presents and tinsel. Possibly these other uses may be more important and even more durable than the gifts that are to be found there during this season.

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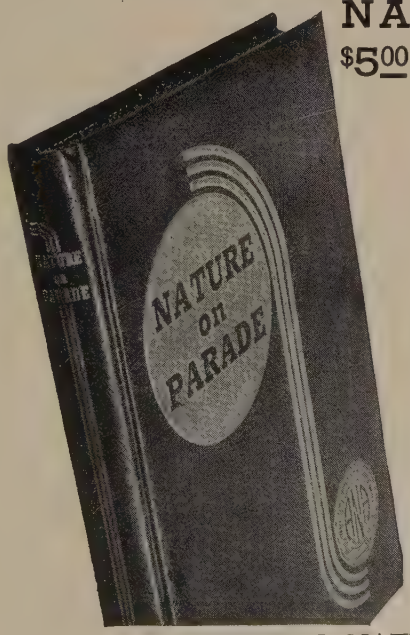

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HEART'S RUE AND SELF-DEFENSE

(Continued from page 518)

By now I had tried many kinds of food on her, the thing that thrilled her most being fresh pineapple rind. Maybe she would drink pineapple juice. But when I put some into her dish, although obviously excited, she had not the haziest idea of how to take it. She knew neither how to drink nor lap, but put her entire muzzle into it, only to back away half choked and sneezing. She kept trying, always the same way with the same unfortunate results, licking her spattered paws between whiles, and wiping her nose on some dry grass on the floor. Only after little chunks of bread were dropped into the juice could she get any in comfort, lifting out the saturated pieces very neatly with her big front teeth, then sitting up squirrel style to eat them with many a loud and drooling smack.

Sometimes she tried to gnaw the short stiff wire shank that kept the cage door closed, and had I not realized it was salty from frequent contact with my hands, I might have thought she understood its function. Even not understanding, she must have worked on it one night until the door came open, for I found her in the morning asleep on a carton of studio odds and ends. She looked up dreamily an instant and went right back to sleep again. When she roused I held a cup of grain while she ate from it calmly. I gave her a bit of carrot, and there, with no wire between us, we had a pleasant chummy interlude. Although loose perhaps for many hours in the studio she had gnawed nothing, either for the fun of whittling with her big sharp chisel teeth, or for the salt from my hands on books and furniture, or as a means of getting clear away. I often let her have the run of the room after that, when I was in it.

One day I gave her a pineapple rind and while she was engrossed in its deliciousness, I gently put my fingers on her head. The spines rose a little but she went on eating and I ran my hand on down her back. The quills rose by instinct and were instantly lowered by intelligence, for while ancestral predilection told her to distrust me, she had reason to regard me as a friend.

Porcupines, although not social, are sociable, and when, after looking a long time in silence at me from the cage, she would remark, "Waa wanx," I thought she may have wanted more than just to be let out. So I gave her a mirror as a substitute for porcupine companionship. She walked eagerly toward it. But when her nose touched, not the warm nose of another porcupine but a cold, hard, invisible something, she backed away with quills on end and eyes opening so wide they showed their "whites" of paled-out lazuli. Presently regaining her poise, however, she seemed to grasp the fact that she and her new-found friend could not step beyond the unseen but otherwise harmless barrier. Yet, although she often sat close to the looking glass by day, at night she must have tried at times to pass through it, for often the surface was dulled in the morning by many prints of her nose and paws.

As weeks went by my notes on Fatima became ever more repetitious, a condition of diminishing returns. It was time at last to set her free. But because our improved relations might inspire the notion that it would be all right to resume nocturnal gnawings on my wooden house, I decided not to release her too close to home. Seven miles away on another mountain in a drizzling rain, I let her go. But like the heroes in the Pirates of Penzance, she did not go. Although out of the cage she sat for some time looking all about her. Then she took a few steps, stopped, and looked around at me. "Go on!" I said. She shook the rain from her quills in a sort of slow-motion hula and with great deliberation went a yard more, almost to the trunk of a tall straight pine. It was bare of branches for all of thirty feet, but up it now she went, stopping at six, fifteen, and twenty feet or so to rest, and looking down. Then she went on up and disappeared into the clustering feathers of the rain-drenched tree.

I thought as I drove on to town for food, how, if "we are what we eat," Fatima must have changed while dining on my fare. It would not be a difference to be noticed by the eye, but perhaps in a subtle perfume perceptible to her porcupine acquaintances. Wood chewers that they are, porcupines smell distinctly like fermented wood. Maybe, like her Oriental namesake, my porcupine, after all the orange, banana, and especially pineapple she had reveled in, would have an exotic mysterious appeal, which some beau porcupine would find quite irresistible. An apple for an Adam's Eve; a pineapple for a porcupine's enchantress.

She went away in mid-July. Six weeks later on a humid afternoon a distinct scent of fermented wood drifted in through the open studio door. It lasted but a moment and being very hard at work I went right on with my writing. Later, as I went to step outside, I saw on the stones three quills. Had "just another porcupine" paused on the step and then gone on his way? Or were these the calling cards of my Fatima, demonstrating what I cannot prove, that, like many beasts, porcupines have a homing instinct? Had she, suffering nostalgia, and perhaps remembering rare tropical fruits, toddled on her short legs home again? If only I had gotten up and looked out of the door I might have learned the answer. As it is, I am afraid I will never really know.

Tracks of Animals

Animal Tracks. By George F. Mason. New York. 1943. William Morrow and Company. 96 pages. Illustrations by the Author. $1.50.

This is an excellent and handy little book for young Americans who have an interest in the outdoors and sufficiently inquiring minds to wish to know what animal has passed that way and left its tracks in snow, mud or sand. From these tracks the alert young naturalist may reconstruct the story of wild events. Forty-four mammals, from grasshopper mouse to grizzly bear, are included, each description of the animal's habits being supplemented by drawings of the animal itself and its tracks. The author-artist is staff artist at the American Museum of Natural History, and has done much field work on Museum expeditions. He has provided a fine and practical little book, of value to all amateur naturalists, young and old.

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A RINGSIDE SEAT

By Eve T. Knower

There was a sudden and startlingly huge commotion right in the middle of my acre. For a few seconds it looked like perhaps four hawks doing ragged and awkward but vigorous cartwheels. Then it sorted itself out and two Chinese cocks stood with beaks about eight inches apart, ruffled centers of hostility and fury. For a few minutes there was attack and retreat; guard, attack, and retreat—with the honors about even. They settled to a sort of ritual, something like two hockey leaders with their sticks ready for a get-a-way. The cocks would crouch low to the ground with bright heads stretched forward making passes at the ground between.

Finally differences were apparent. One was more challenging. He stood, swept the ground with his tail, turned and danced. His tail swept the ground like the pawing hoof of a bull. He came back again and again to the crouching; head bobbing. One could see, too, that his colors were a bit more gorgeous than those of the second cock. But it was the second cock who was winning for all that. He was surly instead of flashy. His wings almost trailed the ground in his sulky choler. He, obviously, had right on his side. He defended hearth and home—and scorned the frills. No nonsense about him, and he was having none either. With every flash of hostility he had young Lochinvar a bit farther toward the edge of the acre.

Young Lochinvar swept and stepped, but he was increasingly nervous. He knew that he was beaten. For the sake of appearances, which old Surly Chops seemed willing to concede him, he stuck to his fine fencing until a proper truce was declared, with both lords walking the boundaries of no man's land in haughty ignorance of any but solitary existence. Then young Lochinvar broke, and with a defiant crow or two but with increasing and, at the last, excited haste he was off—definitely. One could see that he was on his way to tell his gentle wives of the glorious battle he had just won!

Lochinvar has been back, even across the acre. But he is cautious, and very self-conscious. And he always finds some good reason for never invading the cover on old Surly Chops' side.

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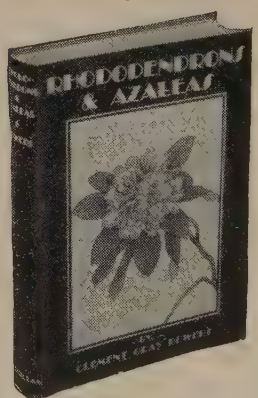

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NATURE IN PRINT

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(Continued from page 538)

the diversity of crop plants, the appearance of pastures, the condition of woodlands, the gullies that go with extravagance, the terraces bespeaking conservation, the very direction the plow furrows take—these things and others like them are bits of a great pattern with a living memory. Pieced together and interpreted correctly they furnish a commentary on America more accurate than all the histories ever written."

Dr. Van Dersal's book is, indeed, the demonstration of this that he hoped it would be—a commentary to be read with great profit. Disarmingly simple in its table of contents (announcing such chapters as Grains on the Land, Vegetable Gardens on a Grand Scale, Land for Livestock, Forests and Woodlands, Land for Wildlife and Recreation), *The American Land* is more than a volume of information about agricultural and other rural or wild land uses; it is also an achievement in synthesizing this information into a book that is at the same time useful, interesting, inspiring, and provocative.

The American Land is a book both to own and to bestow, and with it *Years of This Land* would certainly make a prize present or possession, for the perspective in Space that Dr. Van Dersal makes possible for his readers is nicely comparable to Dr. Muelder's and Dr. Delo's perspective in Time. The same pride of a real patriotism pervades both volumes, despite their also similar warnings against continued unwise exploitation. Through both geological and historic time, Dr. Muelder and Dr. Delo trace the development of the resources that have made it possible for men to make of the United States a great nation, and they do this with an eloquence that can carry the reader through the volume in a single sitting.

"North America," they write in their beginning, "lay broad and beautiful in the warm sunlight. But the warmth soon fled. The snows came thickly, and far to the north, the ice-sheets gradually piled higher. Four times in the million years between then and now they grew, and melted, and grew again. . . ."

"The future," they conclude after completing their geographical history, "is still elusive as fate, but the problems of the here and now and the perplexities of the past need not escape us. . . . Faith in these remains: the whirling winds, the pressing rocks, the warming sun, the rushing waters—without mercy, but also without malice."

It is a good fortune indeed to be able in an armchair to retrace with geographer-historians the years of this land, to survey the land of today with the eyes of a biologist, and—still in the armchair—to journey into America itself, not the America of time or place but of a third dimension of human emotions, by the grace of the powers of a great writer. It is a fortune that one covets for many readers, not only for the sake of the readers but for the sake of the Nation itself, destined as it is to profit or lose by the understanding or neglect of the real foundations of its prosperity.

Years of This Land: A Geographical History of the United States. By Hermann R. Muelder and David M. Delo. New York and London: D. Appleton-Century Co., Inc. 1943. 243 pp., with 11 photographs, 11 text maps, and index. $2.50.

The American Land: Its History and Its Uses. By William R. Van Dersal. New York, London, and Toronto: Oxford University Press. 1943. 215 pp., with 128 photographs on 65 plates, 2 text maps, and index. $3.75.

Journey into America. By Donald Culross Peattie. Boston: Houghton Mifflin Company. 1943. 276 pp., with endpapers and two other illustrations in color by Lynd Ward. $3.

Earthworms at Work

The Earthmaster System. By Thomas J. Barrett. Roscoe, California. 1943. Published by the Author. 32 pages. Multigraphed. $1.00.

The author of this leaflet has worked for a long time with earthworms, propagating and using them to build up soil biologically. His work was carried on concurrently with that of the late George Sheffield Oliver, and their experiments complemented and confirmed one another. In order to bring the results of his discoveries down to popular terms, so that the information may be available to the layman, Dr. Barrett has published this brochure. Physically its sale price of one dollar seems large, but actually the information is what one is purchasing, not a larger number of pages. It seems to us that Dr. Barrett has done an excellent job of condensation (a task that appeals to an editor), and has succeeded in putting the details of working with and using earthworms into most practical form.

Forest Fire History

Burning an Empire. By Stewart H. Holbrook. New York. 1943. The Macmillan Company. 229 pages. Illustrated. $2.50.

This is a stirring and tragic book of America's not far distant past. It is a history of our nation's forest fires that snatched uncounted billions of board feet of timber from our national resources treasure chest; destroyed millions in property values, and claimed hundreds of lives. The author is both a good woodsman and a good reporter. He has worked in lumber camps, fought forest fires and serves part time on the staff of the Washington State Division of Forestry. He is also a newspaperman and free-lance writer. To gather the material for this book he travelled widely to the scene of great forest fire disasters of the past, intervewing survivors, consulting the records and re-creating the tragedies. When one reads the story of flaming death that roared into Hinckley, Minnesota; swept on the gale to wipe out Cloquet; levelled towns from Maine to Washington, one can almost feel the fires' hot tongues. Mr. Holbrook has given us some interesting and valuable history; provided us with some object lessons in forest fire protection; shown us perspective on the great losses from fire in the past and their effect on the present timber supply; drawn a picture that is happily brightened by present-day progress in fighting and in preventing fires. This is not only a significant book, but it is an extremely readable and exciting book, as well.

Mid-West Fishes

Fishes of the Middle West, by Rachel L. Carson, is U. S. Fish and Wildlife Service Conservation Bulletin 34, available from the Superintendent of Documents, Washington, D. C., for 15 cents.

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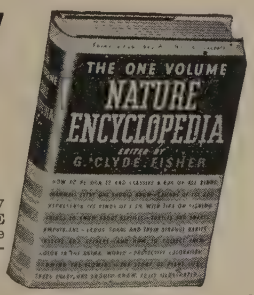

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THE SOUTHERN CONSTELLATIONS

(Continued from page 545)

stellations of Volans, The Flying Fish; Grus, The Crane, and Dorado, The Goldfish, were also among the Bayer groups. The Abbe Nicolas Louis de La Caille, who was called "the true Columbus of the Southern Skies" assigned names to fourteen new groups of stars in the southern hemisphere. Octans is one of these, and is noted for marking the South Pole with its 6th magnitude star Sigma, which is less than one degree from the Pole. There is no bright star in the southern hemisphere close to the Pole. The nearest bright star is the third magnitude star Beta in Hydrus, one of the Bayer groups, which is 12 degrees distant from the Pole.

One cannot leave the skies of the southern hemisphere without reference to the Greater and Lesser Magellanic Clouds, which were first described and named by Magellan. They are great island universes of the order of 100,000 light years distant from the earth. They look like detached clouds of the Milky Way to the naked eye. The Lesser Cloud is the brighter and lies between the borders of Hydrus and Tucana, The Toucan.

The Greater Cloud lies in the constellations of Dorado, The Goldfish, and Mensa, The Table, about 20 degrees from the South Pole. Both clouds are invisible north of the 20th parallel of north latitude. They are known also by the names of Nubecula Major and Minor.

Winter will begin this month in the northern hemisphere on December 22 at 1:30 P.M., E.W.T.

Mercury will be farthest east of the sun on December 22, but will be difficult to find at this time. It will be close to the southwestern horizon at sunset. Venus is in the morning sky, and is gibbous in phase as seen in the telescope. Mars will be in opposition to the sun on December 5, and rises at sunset. It is now as bright as Sirius. Jupiter will pass very close to the moon on the morning of December 17, and in Europe there will be an occultation of Jupiter by the moon at that time. Saturn is in opposition to the sun on December 16, when it will be brighter than any of the stars except Sirius and Canopus. The rings are now in their most favorable position for observation.

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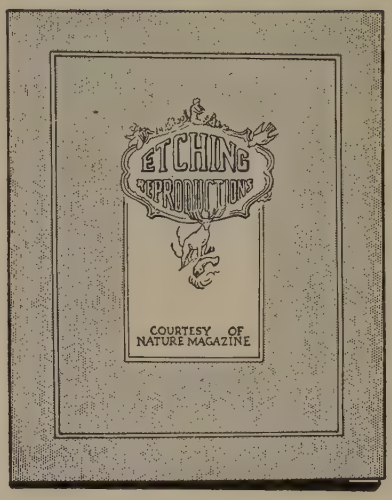

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EMPIRE OF SAND AND SUN

(Continued from page 522)

formed over the Vulture Mountains and appeared neither to change nor melt away. I tramped listlessly on through the creosote and mixed desert scrub, approaching the dust-colored hills. Even thinking seemed to come only with flagellation of the will.

In the first shallow wash the slight breath of a breeze was cooling—cooling if there was water to drink and you sweated freely; but then your shirt stuck to your back too. The ocotillo, the devil's cigaret lighter or something, was in bloom. It seemed as if the tall, barbed sticks were taking chances in lighting up those blazing tassels, even if there was not much to burn. The woody, perforated bones of cholla were lying about. You had not thought of them dying, they are so invincible.

Then my eye caught the swaying of a loose, gray feather on the prickly joint of a "jumping" golden-spine. A western mocking bird had become entangled in its cruel meshes and was pierced by the treacherous swords. A few hours earlier and I might have rescued the mocker—but already in the oppressive heat flies were beginning to buzz. I suppressed the insistent urge for another long pull at the canteen, and pressed steadily up the slope. Suddenly, that mockingbird seen in the cholla, crucified on its million thorns, had revealed the mood of the desert. I would feel better back on the distant trace of a road.

Yet we can not but admire cholla and creosote, those grotesque, indomitable partners so wholly characteristic of the blazing amphitheatre of the sun. On the far, purple mesas, up the low, gravelly terraces, over the hazy *bajadas,* down into the deathly alkali sinks, they rally and march together. Sometimes they travel alone. They never relinquish any part of their domain permanently, even to man or machine. And under the varnished green of creosote, behind the fierce, bristling bayonets of cholla, a fascinating family of wild things finds refuge.

ANTVILLE ANTICS

(Continued from page 541)

over with their tiny tongues. They frequently wash and massage one another. Not only are they personally clean, but they keep the whole nest in spotless condition. If one dies, it is promptly carried off and buried in a certain corner which serves as a graveyard and garbage dump.

Ants are more particular than people in their food habits. They eat only liquids. Like the fly, they must turn solids into liquids before they can swallow the food. This, by the way, is the work of special workers. There are certain foods of which they are especially fond—orange marmalade, peppermint candy, and flies. In spite of opinion to the contrary, ants eat little. One drop of sweet is a week's ration for a whole colony.

Ants are strongly nationalistic. They are complete isolationists and tolerate no intruders. I once made the mistake of dropping a strange ant into the nest. He was instantly decapitated.

Sad to relate, the latest Antville news reveals that all original inhabitants are dead, except Catherine the Great. For two years they afforded family and friends endless entertainment. Last week the queen's remaining faithful attendant died. The queen in her grief refuses to bury the body. Every few minutes she goes over and caresses it and even tries to feed it. What will become of the lone queen, a ruler without subjects? Will she lose her reason like the poor mad Carlotta, or will she start out all over to found a new dynasty? We can scarcely wait to see.

And so, following King Solomon's advice, I have gone to the ant and considered her ways, but I cannot honestly say that I have become wise.

HENRY HICKS, MISSIONARY

(Continued from page 540)

materials. But if a tree or shrub from afar is better for a certain purpose, he is one of the first to accept it.

It was Henry's father, Edward, who developed the method of moving large trees successfully. The secret lies in keeping the roots pruned so that most of the fibrous roots can be enclosed in a ball of earth. This required shifting them around in the nursery while they were small. But even trees with large brace roots running out from the trunk may be moved by carefully dissecting out the long feeding roots and wrapping them in moss and burlap. Four-horse teams were used to haul the trucks on which these trees were moved in the early days. One shipment to the Marshall Field estate was so large that it was loaded on barges and floated around Long Island.

At 73 Henry Hicks is younger in mind and spirit than most men of 40, younger in body than many at 50. He neither smokes nor drinks, is always active, and has done what he wanted to do all his life. His grounds are a Mecca for all the children in the neighborhood, some of them his grandchildren. He loves them all and they love him.

Not long ago one of the women in the family was walking along the road when she heard a "halloo" from the top of a tall hickory tree. Glancing up she saw it was Henry.

"Henry Hicks, you come down from there before you break your neck!" she called, in real alarm.

"Haven't broken my neck yet," he shouted back. "There are some nuts up here I've got to have."

He is always ready to pack up on a moment's notice to go off on a tour of arboretums or on a plant-hunting expedition. He is always bubbling with enthusiasm. Ideas come pouring out so fast they get all mixed up when he talks. But he is always aiming in the right direction, even though some of his shots may seem a little wild.

If you ask Henry Hicks to name his favorite among the plants he has championed, he rather evades the question. But he has always been interested in the native flora, especially the oaks and pines. He has also pushed such things as hardy azaleas, hollies, beach plums, blueberries, and the plants that provide shelter and food for the birds, as well as beauty for man. The shipmast locust was one of his rediscoveries. This is a strain of locust that grows straighter and taller on Long Island than anywhere else, and it has a wood that will last a century in the ground. The Department of Agriculture was interested and wanted to call it the Quaker locust, but Henry Hicks held out for the old name, insisting that Quakers were not responsible for it.

Just one more story about Henry Hicks, one that I think is typical. Carl Wedell of the New York School of Agriculture at Farmingdale, L. I., tells me that Henry will walk into a class where someone is lecturing on landscaping or horticulture and say, "Come on outdoors with me and I'll show you something real about plants!"

That is Henry Hicks—always the teacher, lovable, unconventional, unexpected, but effective none the less.

An Eel Slip

"Slippery as the eel" is an overworked simile, but we appear to have found one fact about eels a bit slippery in our article in the October issue. The author said that no scientist had ever seen an eel's egg or a female eel ripe with Spawn. Miss Ida M. Mellen, long a member of the staff of the New York Aquarium, takes us to task by pointing out that Johannes Schmidt, Danish naturalist, had established all the stages of eel existence save the egg, when Marie Poland Fish, a member of his expedition to the Sargasso Sea, found some tiny eggs entangled in a dredged-up shrimp, kept them in an aquarium and watched eels hatch from them. We stand corrected.

Scout Taxidermy

Boy Scouts of America, Inc., has just issued a new and revised booklet for use in connection with training for the Taxidermy Merit Badge. The booklet is written by John W. Moyer, Staff Taxidermist of the Field Museum of Natural History, and is a simple and fundamental discussion. The booklet sells for twenty-five cents.

We have always viewed with some alarm the practice of promoting taxidermy by young people because it too often involves the needless destruction of wildlife to obtain specimens on which to practice. We are delighted to note that Mr. Moyer shares our view, and it is a pleasure to quote two paragraphs from his introductory remarks. He writes to Scouts, saying:

"If you have entertained any foolish idea of 'collecting' wild life, forget it. There are hundreds of much better collections that you can hope to make until you become much older and more experienced. If you intend to learn taxidermy just for the sake of earning a Merit Badge, do not under any circumstances kill any wild thing merely to practice the art of preserving and mounting skins. Instead, select for your subjects animals or birds that you can secure in other ways: the chicken, pigeon, duck or turkey that is meant for Sunday dinner, one of the cows that molest the corn field, a cat that has become a chicken thief or bird killer, or a pet that has died.

"It may be that while looking for a suitable specimen to mount in order to meet the requirements, you will happen on a bird or animal which has been injured in some way. If the injury is so obviously serious that to put the sufferer out of its misery in a humane fashion is the only decent thing, then do so. But think before you do it. If it is only a slight sprain or a broken wing, you may be able by the use of first aid to help the creature get well. To a Scout, a living creature is better than a dead one at any time, no matter how perfectly the creature is mounted. Use only specimens for skinning or mounting that are legitimately killed."

Chipmunk Orphans

"The death of a female Hopi chipmunk orphaned her litter of five young, who were found in a starving condition in the Pipe Shrine House kiva by the archeological foreman," says a report from Mesa Verde National Park. "One had already died of starvation and the other four were too weak to move about when they were brought to headquarters. They were turned over to the 13-year-old son of the Acting Park Naturalist, who by dint of much care and frequent feedings of minute quantities of warm milk with an eye-dropper during the first few hours, revived them. One developed a swelling about the head and died within a few days, but the others have grown into perky specimens of striped sauciness who are certain that human shoulders were made for perching, human ears for exercising growing teeth upon, and a boy's pockets the best of all places to dive into when frightened by the unusual. Their foster parent is hopeful that when they are old enough to be turned out they will remember the good things kept in those pockets for them."

SEA-GULL GAME

By Florence E. Pidge

In the Seneca River above the dam at Baldwinsville, New York, the ice was breaking up. From the bridge below I could see the gulls winging their way upstream. To my surprise each bird alighted on a separate block of ice, and drifted down to the point where the water broke over the dam. Then like winter coasters climbing up hill with their sleds, they took wing again and flew to find other icy rafts on which to continue the game. I watched this for more than an hour, fascinated by the air of satisfaction that seemed to possess the birds.

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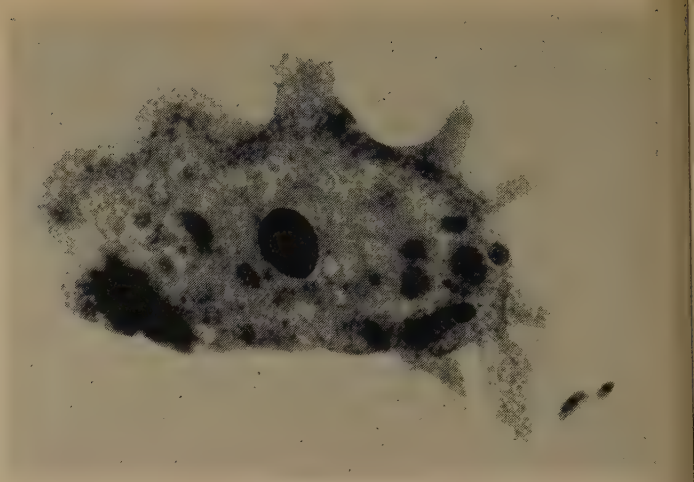
WHAT CAN YOU DO WITH ONE INCH?

Under the Microscope

By JULIAN D. CORRINGTON



Amoeba proteus

THE CLAN AMOEBA

One of the most thrilling experiences in the biological laboratory is the beginning student's first sight of an amœba. No matter his later specialty or further career, he will never forget that period when first he watched the mysterious flowing of naked, primordial protoplasm. Unfortunately, the acquaintanceship ends here except for that very small minority who go on to take an advanced course in protozoology. Even most teachers, annually rejuvenated by presenting amœba to a new audience, know little about the relationships of this animal.

In the classification of Kudo, one of the foremost present-day students of the Protozoa, members of the phylum are first divided into two subphyla, on a basis of possession of flagella, pseudopodia, or no locomotor structures on the one hand, or of cilia on the other; the Plasmodroma (running jelly), including amœbas, and the Ciliophora (hair bearers) as *Paramecium*. The former contains three classes, the Mastigophora (whip bearers, as *Euglena*), Sarcodina (fleshy, as *Amœba*), and Sporozoa (seed animals, as *Plasmodium*, the pathogen of malaria). The Sarcodina, in turn, has two subclasses, the Rhizopoda (root-foot, as *Amœba*) and Actinopoda (ray-foot, as in the Radiolaria). In the Rhizopoda are five orders: Proteomyxa, Mycetozoa, Amœbina, Testacea, and Foraminifera, the Amœbina containing those that have no test or shell and progress by means of blunt, finger-like pseudopodia, known as lobopodia.

Thus far our classification seems easy; one ought to be able to spot a member of the Amœbina readily as a unicellular animal progressing by means of blunt, lobose pseudopodia without axial rays, and without flagella, cilia, or shell. Even so, there are traps for the unwary. In the very first group within this order, the Family Dimastigamœbidae (two-whipped amœbas), one learns that the species have two phases, with flagella in one and pseudopods in the other; the first phase is readily mistaken for a flagellate, the second for a member of the second family, the Amœbidae.

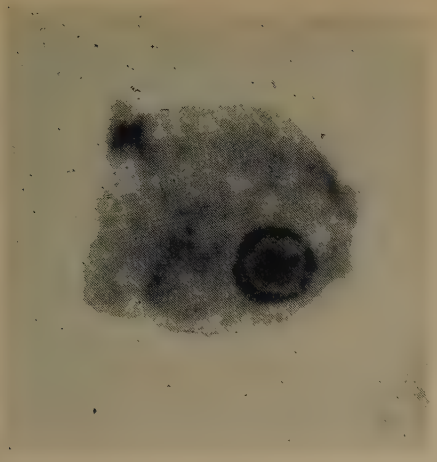
The two other families in this order are the Endamœbidae; and the Paramœbidae; hence we have a galaxy of many species grouped within four families of the amœbas proper, not to mention the members of the Order Testacea, often referred to as shelled amœbas, and including such well known laboratory examples as *Arcella, Difflugia,* and *Centropyxis.*

Genera of the Amœbidae include *Amœba, Dinamœba, Pelomyxa, Vahlkampfia, Hartmannella,* and *Sappinia,* all but the first being unknown to the general student. The various species differ in many particulars: size and shape; number of nuclei, from one to many; details of nuclear construction and behavior of this body during cell division; number, size, and shape of pseudopodia; presence or absence of a pellicle and with or without longitudinal ridges; presence or absence, and number, of contractile vacuoles; character and number of various inclusions, notably of crystals; methods of reproduction; and habitat, whether salt, brackish, or fresh water, in moss, in damp soil, or parasitic in the digestive tracts of many kinds of host animals. By no means every amœba shown to students in the elementary laboratory is the celebrated *Amœba proteus.*

A common misconception is that amœba represents the most primitive form of animal life; but the arrangement here outlined, with the Class Mastigophora given first, would indicate that such is not the case. Simple flagellates, as *Chlamydomonas,* are considered older and more generalized. Another former idea that has gone by the board is that amœba, in common with many protozoans, demonstrates amitosis in binary fission. Many species of this phylum display an excellent and complete mitosis, notably in the heliozoa, close relatives of the amœbas and, while this is not true of amœba, *A. proteus* does exhibit a primitive division figure with an equatorial plate and sometimes faint spindle fibers. A recent estimate of the number of chromatin granules present is from 500 to 600 and one investigator calls these chromosomes, a designation with which others would not agree; but the process is clearly a forerunner of complete mitosis, and about what one would expect to find in the evolution of so complex a procedure.

With few exceptions, parasitic amœbas belong to the Family Endamœbidae, all of which are exclusively endoparasitic. A striking character of the whole group is the absence of a contractile vacuole. Most notorious is *Entamœba (Endamœba) histolytica,* the cause of amœbic dysentery in man, an infection that may reach epidemic proportions. Eleven to twelve percent of the general population of the United States harbor this protozoan in the digestive tract and liver, those with acute cases showing varying symptoms from mild diarrhea to dysentery, others, being carriers, having chronic infections without accompanying symptoms. The parasite has a world-wide distribution, and the disease is known medically as amœbiasis.

This amœba has an active, motile, or trophozoite (feeding) stage, during which it invades the wall of the intestine, and ingests tissue cells and blood corpuscles, producing hemorrhage and other terrific conditions in severe cases, which may terminate fatally. At times the motile cells encyst and become inactive, passing out with the host feces, from which source other persons are infected through contamination of food and drink by unsanitary habits and conditions, water pollution, flies, but chiefly through



Entamoeba histolytica

food handlers who are carriers. Infection is direct, without an intermediate host.

A number of other species are known in man, all of which are now regarded as harmless commensals: *Entamœba coli, E. gingivalis* in the mouth, *Endolimax nana, Iodamœba butschlii,* and *Dientamœba fragilis.* These must be studied, however, in order to insure a correct diagnosis from an examination of fecal smears when *E. histolytica* is suspected. Likewise there are many species attacking a whole array of vertebrate and invertebrate hosts other than man, while *E. histolytica* itself has been reported from monkeys, dogs, pigs, and other hosts.

Material for study of the parasitic species is obtained from fecal smears of infected persons or animals. Both free-living and parasitic forms may be trapped on a slide coated with Mayer's albumen fixative, and when nearly but not quite dry, fixed with Schaudinn's fluid. Double stain free-living forms with such combinations as Delafield's hematoxylin and eosin, safranin and fast green, or eosin and methylene blue; single stain parasitic specimens with iron hematoxylin. Sections of autopsied intestine showing the pathogens in place in the mucous membrane are also widely used.

FOUR HUNDRED YEARS OF RESEARCH

Doubtless the most important year in the history of civilization occurred just four hundred years ago, in 1543. Few people could identify that date with any particular event, and most of our standard texts in history would enlighten the reader little if at all. To understand the importance here assigned to 1543, a year that ushered in a new era in human thought, it is necessary to evaluate the background against which developments must be viewed to achieve a proper perspective.

For more than a thousand years European civilization had been submerged in the Dark Ages. Petty wars, poverty, disease, and ignorance ruled the day; the hand of the Church dealt summarily with free-thinkers. Life for the peasant was hard and brief. He was intermittently dragged from his plow to be marched off to some war concerning which he knew little or nothing; he could neither read nor write; State and Church ruled his actions, his thoughts, and taxed away all but his bare sustenance. Those who had come through the pathological perils of infancy and childhood had to run the gauntlet of the great epidemics; bubonic plague, syphilis, smallpox, typhus. The noble fared little better save in the matter of wealth. Being better fed his average health was probably somewhat superior to that of his serfs, yet he was commonly pock-marked, carried a flea glass in order to amuse himself by inspecting his external parasites, and believed in a great array of absurd superstitions. Only the clergy preserved any semblance of learning.

Conditions of this nature were not done away with in any one year; man struggled slowly and painfully ahead, with his Bills of Rights, his Pasteurs and Ehrlichs, his general education measures, and his technological inventions; he has yet to discover a substitute for war and cures for many other evils. The end of the road to Utopia is not even in sight, but the pavement steadily and definitely improves with each passing milestone.

The great revolution of 1543 affected none of these things directly or immediately—yet was responsible for all subsequent improvement and will eventually triumph over present and future obstacles if, indeed, man is to survive. The arch enemy of man was the Dark Ages attitude; inability and disinclination to think about worldly matters; regarding this life as merely a pain-racked and toilsome preparation for the life hereafter, which alone was worthwhile; and a reliance upon authority. Those adopting such an unrealistic view of life, well nigh universal, comprised the group dubbed Scholastics, and the movement was termed Scholasticism.

There was no point in studying anatomy; Galen, the Roman physician of the Second Century A.D., had written all there was to be

References for the Microscopist

For the past several months we have suggested in this column a number of basic books as providing background for work with the microscope. With this issue we are taking the next step and listing our recommendations in six additional fields. In so far as the subjects interest you, buy one of these each month, or as often as you can. They make excellent gifts for others, or as suggestions for those who will wish to remember your birthday.

ALGAE

Fresh-water Algae of the United States, by G. M. Smith. The outstanding complete manual, with descriptions, full accounts, ecology, and collecting $6.00

Algae, the Grass of Many Waters, by L. H. Tiffany. An account of this group that will interest all microscopists $3.50

BACTERIOLOGY

Fundamentals of Bacteriology, by M. Frobisher. A very complete account of all groups and methods....$4.00

General Bacteriology, by D. B. Swingle. Briefer treatment than the preceding; very well written and illustrated $3.00

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Biology of the Protozoa, by G. N. Calkins. Standard text and reference for the group; not for identification. $7.50

TEXTILES

Textiles and the Microscope, by E. R. Schwarz. Concise and comprehensive manual on use of microscope in analyzing textiles $4.00

Textile Fibers: Their Physical, Microscopical, and Chemical Properties, by J. M. Matthews. One of the standard texts and references on this subject $10.00

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known about this basic subject. Therefore study Galen, not the cadaver. Why observe Nature, animals, plants, the heavens? It had all been done before by such giants as Aristotle, Ptolemy, Dioscorides, and others. Instead, much more was to be gained in one's passage through this vale of tears, by an introspective contemplation of the soul, of divine purpose, of the hereafter, and by debating as to the number of angels that could stand at the same instant on the point of a needle!

So firm and so age-long was this grip of the churchmen scholastics on the mind of man, and so great the reliance upon classical authority, that nothing short of an intellectual earthquake was needed to revive the spirit of independent learning and original inquiry into things of this world. That earthquake exploded in 1543 with the publication of two of the most significant of all products of the human mind: *De Revolutionibus Orbium Cœlestium* (On the revolutions of the heavenly bodies) of Nicolaus Copernicus and *De Humani Corporis Fabrica* (On the structure of the human body) by Andreas Vesalius, the fiery and forceful young Belgian, just graduated from medical school at Padua.

Copernicus, it is said, received a copy of his great work as he lay on his deathbed. In it, he proved that the Earth was by no means the center of the universe; that it was but one of several planets revolving around the Sun (instead of the Sun around the Earth)—a very deflating truth to mundane ego and a severe blow to ecclesiastical dogma. Vesalius proved that, far from being infallible, Galen had made numerous mistakes; he threw Galen's book out the window and thenceforth taught human anatomy from the specimen, rather than from books, and himself dissected and explained the subject to his students.

A heliocentric astronomy (Copernican) replaced the old geocentric (Ptolemaic) one, and human anatomy became indeed human, replacing the Galenic descriptions that had been based on dissections of dogs. But of broader importance were the general results in freeing men's minds, the overthrow of reliance upon authority, and the replacing of Scholasticism by a lively Humanism, that took an interest in the living man and the things of the present world. Thereafter steady progress was made by the direct methods of observation and experiment, and scientists became modern research students. All things considered, 1543 was the most significant year in all history.

TRADE NOTES

Finger Prints, Palms and Soles, an introduction to dermatoglyphics, is a new book by Harold Cummins and Charles Midlo, Tulane professors. Here, for the first time, have been brought together in a single volume the results of all of the many separate lines of investigation having to do with finger prints, more precisely and inclusively designated as the science of dermatoglyphics (skin carvings).

History of this science, nature of the skin and its ridge patterns, methods of printing palms, soles, fingers, and toes, classification and filing of prints for identification, comparative studies in lower animals, development, symmetry, inheritance, studies on twins, cases of questioned paternity, racial variations, and correlations with other traits; all of these considerations are covered, providing a splendid new addition to the literature of human biology, anthropology, genetics, criminology, and related fields. This book is an excellent example of modern, painstaking, detailed research; the amount of documented material is enormous, and very well illustrated; there are 49 tables, many graphs, and a bibliography of 361 entries. This will be a welcome and important addition to the library of all of our readers who have any interest in the subject, and to the book collections of schools, colleges, and many varieties of institution. Pp. xi, 309; figs. 149. The Blakiston Co., 1012 Walnut St., Philadelphia 5, Pa., 1943. $4.00.

Among the "humanizing science" series of the Jacques Cattell Press, designed to present authentic scientific information in popular form, reviewed from time to time in these columns, comes now a splendid new botany, *The Green Earth,* by Harold W. Rickett, one time teacher and now of the New York Botanical Garden. For the general reader this is an especially commendable volume as it is not in textbook form, being rather a series of essays. The author begins with a discussion of the green color of leaves and what comes of it, thence to the anatomy of leaves, then of the other plant parts, growth, flowers, fruits, heredity, names, evolution, and lower plant groups. Highly unusual and interesting are the chapters on the purposes of plants, names, and evolution; on the other hand the section on genetics is not handled as clearly as in the average general botany text.

Dr. Rickett takes as his central theme the vast importance of chlorophyll as the basic substance of the world, and develops it with surpassing skill. As a naturalist he conveys the beauty, interest, and pleasure to be found in Nature, past and present. All classes of readers, from professional botanist to farmer or gardener will enjoy this fine book. The illustrations are uniquely beautiful pencil sketches by the author. Pp. 353; 100 illustrations. The Jacques Cattell Press, Lancaster, Pa., 1943. $3.50.

Entomologies customarily are systemic or economic. In Professor S. W. Frost's *General Entomology,* however, the treatment is truly biological so that we are impelled to suggest "Insect Biology" as a more appropriate title. Some of the chapter headings will convey the author's approach: Metamorphosis, Immature Insects, Color, Sonification, Insect Behavior, Gall Insects, Aquatic Insects, and Cessation of Activity. Professor Frost has been at great pains to consult a very large number of references and to secure copious and varied illustrations, which add much to the reader's interest. There are also many new and valuable keys and tables.

We have some quarrel with the arrangement. The most difficult chapter, on the Origin and Distribution of Insects, is placed at the front and introduces a welter of technical language, including names of groups, yet the book is intended for beginners to whom, presumably, these names and terms mean nothing. Chapter V, Orders of Insects, seems to us a necessary preliminary and should precede. Other rearrangements of a similar nature would appear logical and helpful, while the proofreading leaves much to be desired and the style lacks literary merit.

Nevertheless the book as a whole is well done and a distinct contribution to entomological literature. It is more suitable as a general text for the non-professional than other works we have seen, and forms an excellent ecological and biological reference for the entomologist. Pp. x, 524; figs. 406. McGraw-Hill Book Co., Inc., 330 W. 42d St., New York, 1942. $4.00.

INDEX TO NATURE MAGAZINE

January-December, 1943

(*Gen.* indicates a general article; *fig.*, a photograph or drawing; *rev.*, a review; *port.*, a portrait.)

ASTRONOMY

A Century of Comets, 437-438 (gen., fig.), 444.
Alpha Carinae, 545.
Argo Navis, 545.
But Not the Stars, 270 (poem).
Centaurus, 545.
Leonids, 492 (poem).
Mercury, 269, 271.
Milky Way, 544, 545.
Moon, eclipse, 44, 45, 99.
Nova Puppis, 98, 99.
November Nova Fades, 98-99 (gen., fig.), 104.
Orion, Return of, 486 (poem).
Polar Skies, 491-492 (gen., fig.), 494.
Southern Constellations, 544-545 (gen., fig.).
Southern Cross, 545.
Southern Fish, 544.
Star Magnitudes, 155-156 (gen., fig.).
Sun and Weather, 494 (rev.).
Sun, eclipse, 44, 45, 99, 104.
Sunspot Group, New Cycle, 381-382 (gen., fig.), 385.
The Heavens in 1943, 44-45 (gen., fig.).
The Heavens, June-July, 324-326 (gen., fig.).
Thy Stars, 45 (poem).
Venus, Phases of, 269-271 (gen., fig.).
Within the Zodiac, 213-214 (gen., fig.), 220.

BIOGRAPHY

Agassiz, Louis, 315, 316 (drawings).
Anaximines, 124.
Aristotle, 124.
Bartram, John, 385-386 (rev.).
Broley, Charles L., 133.
Burbank, Luther, 496 (rev.).
Carver, George W., 343.
Comstock, Anna Botsford, 315.
Copernicus, 124, 556.
Darwin, Charles, 183.
da Vinci, Leonardo, 124.
De Chauliac, Guy, 297.
Democritus, 124.
Eastwood, Alice, 109.
Empedocles, 124.
Galileo, 125.
Heraclitus, 124.
Herschel, 156.
Hicks, Henry, 539-540 (port.).
Hipparchus, 156.
Huntsman, Benjamin, 182.
Joblot, Louis, 279.
Jordan, David Starr, 315.
Lavoisier, Antoine L., 125, 126.
Marggraf, Andreas S., 125.
McGee, Michael, 352-354, 354 (port.).
Miner, Jack, 498 (port.).
Morse, Edward Sylvester, 80 (rev.), 106.
Mushet, Robert, 182.
Needham, John T., 280.
Palmer, E. Laurence, 314-316 (port.), 332.
Paracelsus, 125.
Pasteur, Louis, 503-504.
Perkin, William, 126.
Priestly, Joseph, 125.
Ptolemy, 155.
Ray, John, Naturalist, 426 (rev.), 442.
Rogers, Ginger, 409 (port.).
Salten, Felix, 203.
Sawyer, E. J., 289.
Scheele, Karl W., 125, 182.
Shakespeare, William, 191.
Spallanzani, Lazzaro, 280.
Teale, Edwin Way, 34, 50.
Thales, 124.
van Helmont, 125.
Wohler, Friedrich, 126.

BIRDS

Auklet, crested, 41 (fig.).
  least, 41 (fig.).
  paroquet, 42.
Bee-eater, 177.
Bell-bird, crested, 177.
Bell-miner, 177.
Bird Display, 106 (rev.).
Bird Watcher, 147-149 (gen., fig.).
Birds and Man, 389 (booklet).
Birds and Men, 373 (poem).
Birds, Cape Prince of Wales, 329 (rev.).
Birds' Nests, 258 (poem).
Birds of Gardens, 188-189 (gen., fig.).
Birds of States, 386.
Birds, Pacific Coast, Nests, 274 (booklet).
Birds, Western, 193-200 (gen., fig.).
Blackbird, 200, 210.
  English, 63.
  redwing, 84 (fig.).
Bluebird, 84, 88 (fig.), 188, 210, 211, 496 (State bird).
  mountain, 188 (fig.), 193 (fig.), 194, 198 (gen.).
Bluejay, 188, 200, 210 (fig.), 256 (fig.).
Bobolink, 84.
Bobwhite, 189.
Bower bird, Queensland, 179.
  satin, 179.
Boy and Birds, 38 (gen., fig.).
Bubo virginianus, 133.
Bunting, indigo, 85, 194.
  lark, 193 (fig.), 195, 199 (gen.).
  lazuli, 193 (fig.), 194, 199 (gen.).
Bush Birds, Australia, 177-180 (gen., fig.).
Butcher-bird, 91, 177.
Buteo swainsoni, 249.
Canary, 81 (fig.), 83, 84, 88.
Caracara, 149.
  Audubon's, 242.
Cardinal, 188, 496 (State bird).
Carpodacus purpureus, 352.
Catbird, 84, 87 (fig.), 177, 189.
Cepphus columba, 42.
Chapparal-cock, 522.
Chat, yellow-breasted, 84, 88 (fig.).
Chewink, 147.
Chickadee, 38 (poem), 84, 188, 189, 212 (fig.).
Coachwhip bird, 178.
Cockatoo, blood-stained, 176.
  rose-breasted, 176 (fig.).
Condor (emblem), 468 (fig.).
Cormorant, 41.
  Farallon, 476-477 (gen., fig.).
Corvus brachyrhynchos, 401.
Cowbird, 148, 299, 406.
Crane, sandbill, 240 (fig.), 242 (fig.).
Creeper, brown, 212.
Crow, 82 (fig.), 84, 119, 200, 206 (poem).
  common, 401-404 (gen., fig.).
Cuckoo, 212.
Dickcissel, 194, 195 (fig.), 199, 200 (gen.).
Dipper, 193.
Dove, mourning, 189, 425, 521 (fig.), 522.
  white-winged, 425.
Duck, Goldeneye, 288 (fig.).
  old-squaw, 291.
Ducks, Geese, and Swans, 215 (rev.).
Eagle, 290, 343.
  bald, 133, 465 (fig., emblem), 467-469 (fig., emblem).
  stories of, 33 (gen.).
Egret, American, 65 (fig.), 68, 287, 367 (gen., fig.).
Emu, 178 (fig.), 180, 244 (fig., track), 246, 466 (fig., emblem).
Fantail, white-shafted, 179 (fig.).
Feathered Gems, 237 (gen.).
Finch, house, 193 (fig.), 194, 199 (gen.).
  purple, 189, 194, 352-354 (gen., fig.).
  weaver, 180.
Flicker, 83, 189.
Flycatcher, 177, 189.
  crested, 299.
  olive-sided, 149.
Frog-mouth, 180 (fig.).
Galah, 176 (fig.).
Gallinule, Florida, 149.
Gnatcatcher, 299 (fig.), 300 (fig.) 301 (fig.), 332.
  blue-gray, 149.
  plumbeous, 522.
Goldfinch, 64 (fig.), 81 (fig.), 84, 189.
Greenlet, 189.
Grosbeak, 210.
  cardinal, 84, 88 (fig.), 96.
  evening, 144 (gen., fig.), 189, 352-354 (gen., fig.).
  pine, 189.
  rose-breasted, 188.
Grouse, 83.
Guillemot, pigeon, 42.
Gull, 76.
  western, 379 (gen., fig.).
Hawk, 119, 210, 288 (fig.), 289 (fig.), 403.
  broad-winged, 202.
  fish, 33.
  duck, 65.
  rough-legged, 436.
  sharp-shinned, 290.
  Swainson, Life of, 249-254 (gen., fig.3.
Hawk's Day, 348 (poem).
Heron, black-crowned night, 367.
  great blue, 367.
Hummingbird, ruby-throated, 189.
  calliope, 189 (fig.). 380 (gen., fig.).
Jay, Canada, 195 (fig.), 196 (gen.), 200.
  pinyon, 194 (fig.), 197 (gen.), 200.
Junco, 84, 188.
Jungle fowl, 179.
Killdeer, 189.
Kingbird, 84, 92, 195.
  Arkansas, 193 (fig.), 195, 196 (gen.).
Kingfisher, brown, 178.
Kinglet, ruby-crowned, 147.
Kookaburra, 176 (fig.), 177, 178.
Lanius collaris, 91.
Laughing jackass, 176 (fig.), 177.
Lyre bird, 176 (fig.), 177, 178.
Magpie, 177, 193, 194, 195 (fig.), 197 (gen.), 200.
Mallee fowl, 179.
Martin, 177, 189.
Meadowlark, 84, 88 (fig.).
Megapodes, 179.
Mockingbird, 188, 189, 209 (fig.), 237, 253.
  western, 552.
Nighthawk, 83.
  Texas, 522.
Nutcracker, Clark's, 195 (fig.), 197 (gen.), 200.
Nuthatch, 189.
Oriole, 189, 210, 211.
  Baltimore, 84, 194, 299.
  Bullock's, 193 (fig.), 194, 198 (gen.).
Ornithologists' Meeting, 49.
Osprey, 33.
Ostrich, 180.
Ouzel, water, 193 (fig.), 194, 198 (gen.).
Ovenbird, 84.
Owl, 119, 189, 210, 402, 403.
  barn, 135 (fig.), 142 (gen., fig.), 143 (fig.), 160, 202.
  burrowing, 365.
  great-horned, 81 (fig.), 84, 133-134 (gen., fig.).
  snowy, 436.
Parrot, 178.
Pewee, wood, 83 (fig.), 84, 147, 211, 495 (song, rev.).
Phalacrocorax albociliatus, 476-477 (gen., fig.).
Pheasant, 83.
  ring-necked, 202 (gen.), 285.
Phoebe, 84, 211.
Phoenix, 318.
Pigeon, 83, 84, 87 (fig.).
Prairie chicken, 83.
Ptarmigan, 211.
Quail, 83, 84.
  Gambel, 522.
Quetzal (emblem), 467 (fig.).
Rain crow, 211.
Raven, 193, 200, 318.
  northern, 194, 197 (gen.).
Redbird, 209, 210.
Redstart, 148.
Rhea, 180.
Roadrunner, 63, 522.
Robin, 84, 188, 189, 285.
  English, 63.
Rooster, 224, 403.
Sandpiper, 189.
Scrub hen, 180.
Sea quail, 42.
Shrike, 177, 210.
  Chinese, 91.
  loggerhead, 91.
  northern, 91.
  South African, 91.
  white-rumped, 91-92 (gen., fig.), 105, 522.
Snipe, 83.
Sparrow, 188, 290.
  black-throated, 522.
  Brewer's, 405.
  chipping, 85, 148.
  clay-colored, 405-406 (gen., fig.).
  English, 83, 84, 180, 209.
  field, 84, 212.
  fox, 189.
  grasshopper, 84, 88 (fig.).
  lark, 193 (fig.), 194, 195, 199 (gen.)
  Savannah, 84.
  song, 84, 88 (fig.), 148.
  vesper, 83 (fig.), 84.
  white-crowned, 211.
Spoonbill, roseate, 163 (booklet, rev.).
Starling, 38 (fig.), 63, 83, 84, 88 (fig.).
Swallow, 63 (English), 189.
  violet-green, 194 (fig.), 196 (gen.).
  white-breasted, 63.
Swan, trumpeter, 425.
  black, 180.
Tanager, 189.
  scarlet, 84, 189, 211.
The Lord's Tiny Poultry, 209-212 (gen., fig).
Thrasher, 253.
  Bendire, 522.
  brown, 29-30 (gen., fig.), 189.
  Leconte, 521.
  Palmer, 520 (fig.), 522.
Thrush, 189.
  black-capped, 189.
  European song, 63.
  gray, 177, 179 (fig.).
  harmonious, 177, 179 (fig.).
  hermit, 149, 189.
  olive-backed, 210.
  wood. 84, 149, 300.
Tit, 177.
Titmouse, 149.
  tufted, 189.
To a Song Sparrow, 214 (poem).
Towhee, 147, 189.
Tree creeper, white-throated, 180.
  Australian, 177.
Trumpeter of the Prairies, 240-242 (gen., fig.).
Turkey, scrub, 180.
  wild, 66, 480 (fig., nest), 523-526 (gen., fig.).
Veery, 84, 189.
Vireo, Philadelphia, 148.
  red-eyed, 83 (fig.), 84, 189.
  white-eyed, 209.
  yellow-throated, 84, 88 (fig.).
Vireos of the White Oak, 299-301 (gen., fig.), 332.
Vulture, 130, 180.
Warbler, black-poll, 84.
  blue-winged, 84.
  chestnut-sided, 84.
  ground, 189.
  hooded, 84.
  mourning, 84.
  myrtle, 189.
  yellow, 85, 92, 149, 189, 190 (fig.), 210, 211, 406.
  yellow-throated, 148.
Waterfowl, 257.
  migrating, 425.
Water thrush, 84.
  Louisiana, 149, 193.
Waxwing, 189.
  cedar, 84, 88 (fig.), 188, 211, 237 (gen.).
Woodcock, 83, 425.
Woodpecker, 83, 177, 180, 200, 318.
  California, 194 (fig.), 196 (gen.), 200.
  downy, 189, 209.
  ivory-billed, 163 (booklet, rev.).
  red-headed, 195.
  sapsucker, 189.
Wren, cactus, 193 (fig.), 198 (gen.), 522.
  Carolina, 149, 189.
  European, 63.
  heath, 177.
  house, 84.
  winter, 84.
Wren-tit, 193 (fig.), 194, 197 (gen.).

CONSERVATION

Birds, unprotected, 231.
  value of, 216.
Burning an Empire, 550 (rev.).
Conservation, 231.
Conservation Education, 146.
Conservation, To-morrow's America, 218.
Conservationists — Why Have We Failed, 201 (edit.).
Extinct and Vanishing Mammals, 218 (rev.).
Game bird rules, migratory, 425 (gen.).
Green Earth, 556 (rev.).
Indians and Conservation, 427-429 (gen., fig.).
Izaak Walton League, 49.
On the Altar of the Machine, 369 (edit.).
Paper conservation, 445.
Ploughman's Folly, 439 (rev.).
They Need Not Vanish (Mich.), 386 (rev.).
Unlimited Shooting?, 105.
Waterfowl conservation, 63.
Waterfowl, Iowa, 498 (rev.).
Wildlife and The Land, 317 (rev.).
Wildlife and Wishful Thinking, 257-258 (edit.).
Wildlife Conservation, 330 (rev.).
Years of This Land, 538, 550 (rev.).

DISEASES

Amoebiasis, 554.
Black death, 297.
Bubonic plague, 297.
Cholera, 298.
Dysentery, 298.
  amoebic, 554.
Elephantiasis, 297.
Fever, break-bone, 297.
  dengue, 297.
  hay, 349.
  jungle, 296.
  spotted, 298.
  typhoid, 297, 298.
  typhus, 296.
  yellow, 296.
Filariasis, 297.
Goiter, 127.
Malaria, 295, 296.
Plague, hospital, 197, 296 (fig.).
Trichinosis, 390-391 (gen., fig.).

FISHES

Barracuda, 356.
Catfish, 223, 224, 238 (fig.), 239 (fig. egg).
  gaff-topsail, 239 (fig.).
Cod, 408.
  Alaska, 41 (fig.).
  192 (fig., Newfoundland stamp).
Cod-liver oil, 192.
Eel, 416 (gen., fig.), 444, 553.
  silver, 416.
Felichthys marina, 239.
Fish Bites Bird. 41-42 (gen., fig.).
Fish fossil, 28 (fig.).
Fishes of middle west, 550 (rev.).
Gadus macrocephalus, 41.
  marrhua, 182.
Galeichthys felis, 238.
Guppy, 239.
Haddock, 192.
Halibut, 408.
Herring, 408.
King Cod, 192.
Kingfish, 388.

Minnow, 296.
Moray, 223.
Mullet, 290, 356, 388.
Pike, 290, 436.
Remora, 490.
Salmon, Pacific, 408.
Salt-water catfish, 238-239 (gen., fig.).
Sea-horse, 239.
Shark, 192, 224.
Shark, oil, 408.
  mackerel, 356.
  tiger, 355.
Shark's tooth, fossil, 26 (fig.).
Toadfish, 239.
Trout, 436.
Tuna, 408.

FORESTRY

A Forest World, 203 (rev.), 218.
American Forests, 50 (rev.).
An Acre of Trees, 39-40 (gen., fig.).
Common Trees of Florida, 271 (handbook).
Forest Directory, 386 (rev.).
Forest Economics and Finance, 274 (rev.).
Forest fire protection, 108
Forest Fires, 145-146 (gen.).
Forest Magic, 42 (poem).
Nazis in the Woodpile, 106 (rev.).
Timbers of the New World, 331(rev.).
Tomorrow's Trees, 158 (rev.).
Tree Rings, 483-484 (gen., fig.).
Trees, shelter, 496 (rev.).

GARDENS AND GARDENING

Accent on Food, 204-206 (gen., fig.).
Garden Facts, Fall, 374-376 (gen., fig.), 385.
Putting the Garden Away, 319-321 (gen., fig.), 331.
Vegetable Encyclopedia & Garden Guide, 330 (rev.).
Victory Garden Institute, 206.
Victory Gardeners, 93-95 (gen., fig.), 105.
Victory gardening, 204-205 (gen., fig.).

GEOLOGY, METALS, MINERALS, AND CHEMICALS

Aluminum, 15.
  alloy, 410.
Ascorbic acid, 121.
Blister bar, 181, 182.
Brass, 182.
Bronze, 122, 181.
Camphor, synthetic, 158.
Carbide, 184.
Carbon, 181.
Carbon dioxide, 407-410 (gen., fig.), 444, 445.
Carbon monoxide, 409.
Chemistry, 108, 121-126.
Choke damp, 410.
Chromium, 183, 184.
Coal, 122, 158.
Cobalt, 183.
Copper, 122, 181.
Diamond grinding wheel, 184.
Dye, coal tar, 126.
  tests, 124 (fig.).
Earth's Adventures, 103 (rev.).
Filament, 183 (fig.).
Formaldehyde, 409.
Geomorphology, Systematic and Regional, 163 (rev.).
Gold, 124, 125, 181, 183.
Helium, 125.
Hydrochloric acid, 16.
Iodine, 127.
Iron, 122, 181.
Jade, 158.
Lead, 181.
Limestone, 122, 158.
Lithium, 125.
Lucite, 123 (fig.).
Magnesia, milk of, 16.
Magnesite, 16.
Magnesium, 15-17 (gen., fig.), 125.
Manganese, 182.
Marl, 416.
Marsh gas, 160.
Mercury, 125.
Methane, 160.
Methyl methacrylate plastic, 123 (fig.).
Mineral Bulletin, 48 (rev.).
Mineral salts, 127.
Mist, carbon dioxide, 409 (fig.).
Nickel, 187.
Nitrate of soda, 416.
Nitrogen, 158, 376.
Oxide, 183.
Petroleum, 122.
Philosopher's stone, 124.
Quicklime, 416.
Salt, 122, 158.
Scheelite, 183.
Seidlitz powder, 409.
Soda, 122.
Sodium. 125.
Steel, 181-184 (gen., fig.).
Sulfa, 158 (drug).
Sulphur, 158.
Tin, 122, 181.
Tools, Red-Hot Speed, 181-184 (gen., fig.).
Trimethyldioxypurin, 13.
Tungsten, 181-184 (gen., fig.).
Tungsten-steel, 182 (fig.).
Turpentine, 158.
Vanadium, 183, 184.
War Gas Number One, 407-410 (gen., fig.), 444, 445.
Wolframite, 183.

INSECTS AND OTHER INVERTEBRATES

Aëdes aegypti, 296.
Amoeba clan, 554-555 (gen., fig.).
Amoeba proteus, 554 (fig.).
Anopheles quadrimaculatus, 295.
Anoplura, 54.
Ant, 364, 447.
Ants, Captive, 541 (gen., fig.), 552.
Aphid, 54.
  beech tree woolly, 364 (gen., fig.).
Arachne, 232 (poem).
Arcella, 554.
Atoll, 186 (fig.), 187 (fig.).
Bee, 87, 223, 364, 447.
  sting, 222 (fig.).
Beekeeping, 497 (rev.).
Beetle, 447.
  Mexican bean, 204.
  Japanese, 93 (fig.), 374.
Bombyx mori, 423 (gen.).
Borer, flathead, 28 (fig.).
Bovicula bovis, 54.
Bumble-bee, 189.
Busycon contrarium, 304.
  perversa, 304.
Butterfly, 447.
  giant swallow-tail 265 (fig.), 266, 267, 268.
  Navajo skipper, 362 (fig.).
  painted, 189.
  tiger swallow-tail, 265 (fig.), 266, 267, 268.
  white admiral, 406.
Cardisoma, 18.
Caterpillar, 205, 212.
Centipede, 223.
Centropyxis, 554.
Centipede claw, 222 (fig.).
Cilia, 185.
Clam, 403, 408.
Columbicola columbae, 54 (fig.).
Cootie, 503.
Coral, 358.
Coral, fossil, 27 (fig.).
Coral Islands, 185-187 (gen., fig.), 220.
Corn borer, 376.
Crab, land, 18 (fig.).
Cricket, 77, 87, 253.
Cricket, mole, 501.
  snowy tree, 84, 87.
Crinoid, 25 (fig.).
  fossil, 27 (fig.).
Crustacean, 42, 192.
Dientamoeba, 555.
Difflugia, 554.
Dinamoeba, 554.
Dragonfly, 338 (fig.), 371 (fig.).
Earthworms at Work, 550 (rev.).
Entamoeba histolytica, 554, 555 (fig.).
Euglena, 554.
Fasciolaria, 304.
Fifth Column Cats, 265-268 (gen., fig.).
Flea, 297.
Fly, 295 (fig.), 447.
  house, 298.
  tachinid, 363.
General Entomology, 556 (rev.).
Goniocotes gigas, 54 (fig.).
  hologaster, 54.
Goniodes meleagridis, 54 (fig.).
Grasshopper, 87, 253.
Grasshopper Book, 443 (rev.).
Grasshopper Pets, China, 76-77 (gen., fig.).
Haematopinus asini, 502 (fig.).
Hornet, 223.
Humble Backyard Neighbors, 78-79 (gen., fig.).
Hydra, 223.
Insecticide, 217 (rev.).
Insects, 447-448 (gen.).
Insects, fossil, 26 (fig.).
Insects Picture Book, 274 (rev.).
Jellyfish, 28 (fig.).
Julus, 222.
Katydid, 87.
Lamp shell, fossil, 69 (fig.).
Land Crab, Florida, 18 (gen., fig.).
Lobster, 408.
Louse, 285 (fig.), 297, 436.
  bark, 54.
  bee, 54.
  bird, 54.
  body, 502 (fig.).
  cattle, 54.
  chicken, 54 (fig.).
  disease-bearing, 503.
  horse, 502 (fig.).
  ox, 502 (fig.).
  pigeon, 54 (fig.).
  sheep, 54.
  turkey, 54 (fig.).
Lice, 502-503 (gen., fig.).
Linognathus vituli, 502 (fig.).
Lipeurus polytrapezius, 54.
Mallophaga, 54.
Megathymus yuccae navajo, 361.
Menopon biseriatum, 54.
  pallidum, 54.
Millipedes, 222.
Mite, 210, 298, 436.
Mollusk, 78, 192, 304.
Mosquito, 87, 295 (fig.).
  malaria. 295.
Moth, 447, 450 (fig.).
  cecropia, 424.
  hawk, 189.
  luna, 424.
  polyphemus, 419 (fig.), 423 (gen.), 424.
  promethea, 424.
  silkworm, 423 (gen.), 424.
Murex brandaris, 123.
Myriapod, fossil, 28 (fig.).
Navajo skipper, 361-363 (gen., fig.).
Oyster, 403, 408.
Papilio cresphontes, 265.
Paramecium, 554.
Pelomyxa, 554.
Pigeon horntail, 377.
Plankton, 42, 185.
Plant louse, 54, 205, 364, 385.
Polyp, 223.
Porcupines of Shell World, 69 (gen., fig.).
Prociphilus imbricator, 364.
Reef, Great Barrier, 187.
  fossil, 220.
Sappinia, 554.
Scorpion, 223.
Sea lily, 25 (fig.).
Sea nettle, 223.
Sea scorpion, fossil, 26 (fig.).
Silk, 418.
Silk worm, 121.
Slug, 78 (fig.), 79 (fig.).
Snail, 78-79 (gen., fig.).
Spider, 223.
  banded, 528.
  black widow, 223, 528.
  garden, 87.
  golden, 528.
  lynx, 528.
Spider Silk for Bomber Sights, 527-528 (gen., fig.).
Sponge, glass, 471 (gen., fig.).
Squid, 71 (fig.).
Telea polyphemus, 423 (gen.).
The Amateur Entomologist, 392 (rev.).
Tick, 295 (fig.), 436.
  wood, 298.
To an Oyster, 356 (poem).
Trichinella spiralis, 390 (fig.), 392 (fig.).
Trichodectes canis, 54.
  equi, 54.
  ovis, 54.
  scalaris, 54.
Trilobite, fossil, 25 (fig.).
Vahlkampfia, 554.
Wasp, 223, 364, 402, 447.
  ichneumon, 377 (gen., fig.).
Whelk, left-handed, 304 (gen., fig.).
Wood-borer, 189.
Worm, 192.

MAMMALS

Agouti, 101.
Ambergris, 70-72 (gen., fig.), 108.
Armadillo, 290.
Badger, 389.
Bat, 82 (fig.), 84, 86.
Bear, 264, 305.
  Alaska brown, 246 (fig., track), 276.
  black, 43 (fig.).
Bears, Yosemite, 162 (rev.).
Beaver, 27, 399.
  in California, 285.
Bovine Glamour Girl, 22-24 (gen., fig.), 52.
Buffalo, 264.
  water, 175.
Bull, 82.
Cachalot, 70.
Camel, North African, 244 (fig., track).
  one-humped, 243.
Capooa, 456 (fig.), 457-459 (gen.), 500.
Capybara, 457-459 (gen., fig.), 500.
Caribou, 245 (fig., track), 276.
Castor, beaver, 72.
Cat, 82, 86, 119, 188, 210, 276, 290, 403, 436.
  anatomy, 110 (fig.).
  black-tailed New Guinea, 246.
  domestic, 478-479 (gen., fig.).
  white Persian, 368 (fig.).
  wild, 519.
Chimpanzees, 442 (rev.).
Chipmunk, Hopi, 553.
Civet, 72.
Cougar, 264.
Cow, 22-24 (gen., fig.), 436.
Coyote, 389, 542-543 (gen., fig.).
Cynomys ludovicianus, 365.
Deer, 20 (fig.), 289 (fig.), 403, 459 (fig.).
  mule, 19-21 (gen., fig.), 293 (fig.), 294 (fig.).
  skins, 548.
  white-tailed. 67-68.
Deer That Pays a Debt, 293-294 (gen., fig.).
Delphinus delphis, 500.
Dingo, 244 (fig., track), 246.
Dinomys branickii, 101, 104.
Dog, 82, 84, 86, 276, 318 (fig.), 403, 436.
  English setter, 368 (fig.).
  Irish setter, 394 (fig.).
  Scotch terrier, 345-348 (gen., fig.).
  Wild, 243, 246 (Australian), 245 (Burma, track), 246 (New Guinea)
Dolphin, bottle-nose, 355-356 (gen., fig.), 388.
  white-beaked, 388.
Dromedary, 243.
Duckbill, 224.
Echidna, 246.
Elephant, 318 (fig.).
  African, 245.
  Indian, 243 (fig., track), 244.
Elk, 257.
  fawn, 21 (fig.).
  fawn and dog, 19 (fig.).
Fennec, 243, 244 (fig., track).
Fox, 210, 402, 494.
  Arctic, 436.
  desert, 243.
  gray, 67 (fig.).
  kit, 522.
Goat, 436.
Gopher, 8.
  pocket, 253.
Grampus, 356.
Groundhog, Spanky, 154 (gen., fig.).
Hare, varying, 276.
Horse, 82, 120 (fig.), 318 (fig.).
  Arab (emblem), 469 (fig.).
Hunting Partners, 389.
Hyena, striped, 243, 244 (fig., track).
Ivan the Terrible, 129-132 (gen., fig.), 162.
Jackal, 245 (fig., track).
Kangaroo, 177, 244 (fig., track), 245, 246, 466 (emblem).
Koala, 177.
Lamb, 290, 424 (intestines).
Lemmings, 434-436 (gen., fig.).
Lemmus lemmus, 434.
Leopard, 291 (fig.).
  Burma, 245 (fig., track).
Lion, 290, 465-466 (fig., emblem), 468-470 (fig., emblem).
Lion, Babylonian (emblem), 468 (fig.).
Mammals, Colorado, 330 (rev.).
Mammals, Eastern U. S., 370 (rev.), 387.
Man, biology of, 501 (rev.).
Man's Poor Relations, 103 (rev.).
Manatee, 489.
Marmoset, 162 (fig.), 231.
  pygmy, 129-132 (gen., fig.), 162.
Marmot, 291.
Meeting the Mammals, 370 (rev.), 387.
Mink, 210, 291.
Mongoose, 290 (fig.).
Monkey, spider, 458 (fig.).
Moose, 257.
  Alaskan, 345 (fig., track), 276.
Mouse, 402.
Mouse, a Prison, 472 (gen., fig.).
Mouse, field, 303.
  jumping, 430-433 (gen., fig.).
  long-tailed, 430-433 (gen., fig.).
Mouse opossum, 246.
Musk, 72.
Muskrat, 246 (fig., track), 276, 371, 493 (as food).
Opossum, 66 (fig.).
Ovis aries, 423 (gen.).
Ox, 318 (fig.).
Paca, 101.
Pack-rat, 250.
Peccary, 490
Phalanger, dormouse, 246.
Physeter catodon, 70, 71, 72, 108.
Pig, 402.
  wild Indian, 245 (fig., track).
Platypus, duck-billed, 177, 224, 246.
Porcupine, 276, 370 (fig.), 513-518 (gen., fig.).
  Alaskan, 245 (fig., track).
Porpoise, 192, 355 (fig.).
Prairie dog, 365 (gen., fig).
Rabbit, 82, 403.
  Arizona jack, 520.
  Cottontail, 250, 253.
  Snowshoe, 245 (fig., track), 276.
Raccoon, 276, 403.
Rat, 82 (fig.), 86, 297.
Reindeer, 7, 436.
Rukupi, Rare Rodent, 100-101 (gen., fig.), 104.
Sciurus kaibabensis, 263-264 (gen., fig.).
Sea-lion, 355, 488.
Sheep, 318 (fig.).
Sheep, Merino, 418 (fig.), 423 (gen.).
Skunk, 202, 276, 291, 343, 404, 494.
Spermophilus tridecemlineatus, 8 (gen., fig.).
Squirrel, 255 (fig.), 256 (fig.), 276.
  Abert. 264.
  fox, 507.
  gray, 255-256 (gen., fig.), 299 (fig.).
  red, 210.
  Kaibab, 263-264 (gen., fig.).
Squirrel, ground, 8 (gen., fig.), 253, 291.
  Belding, 389.
The Porcupine, 90 (song).
Tiger, 224, 318 (fig.).
Unicorn (emblem), 466 (fig.).

Wallaby, 246.
Wallaroo, 246.
Weasel, 210, 290.
Whale, 488.
killer, 356.
sperm, 70, 71 (fig.), 72 (fig.), 108.
Wildcat, 305.
Wolf, 318.
Woodchuck, 154 (gen., fig.), 399.
Wood rat, 253.

MICROSCOPY

Balsam mounts, 112.
Epithelium, 110-112 (gen., fig.).
Handbook, Microscope, 392 (rev.).
Microscopic equipment, 448.
Physiological Optics, 224 (rev.).
Under the Microscope, 54-55 (gen., fig.), 110-112 (gen., fig.), 166 (gen., fig.), 167, 168, 222-224 (gen., fig.), 278-280 (gen., fig.), 334-336 (gen., fig.), 390-392 (gen., fig.), 446-448 (gen., fig.), 554-556 (gen., fig.).

NATURE EDUCATION

America's Natural Wealth, 136 (rev.).
Anatomy, manuals for study of, 335, 336.
Animal tracks, 548 (rev.).
Audubon and the U. S. O., 378-379 (gen., fig.).
Audubon room, 378 (fig.).
Bird Study in Schools, 96-97 (gen., fig.), 109.
Botany, Laboratory Outline, 111-112 (rev.).
Boy Scouts of America, 287, 305, 328.
Camouflage, Natural History Background, 158 (rev.).
Campfire Girls, 305.
Camping References, 312.
Children's Book Week, 482.
Children's Museums, 501.
Comparative Vertebrate Anatomy, 335 (rev.).
Dilemmas of the Wild, 65-68 (gen., fig.).
Education for Victory, 481 (editorial).
Educational Responsibility, 272-273 (gen.).
Field Museum, 498 (history).
General Biology, College, 336 (rev.).
Girl Scouts, 305.
Hornaday Memorial, 501.
How! Kola!, 268 (song).
Indiana Audubon Year Book, 5 (rev.).
Johnsonia, 105 (rev.), 329 (rev.), 441 (rev.).
Kirtland Society, 225 (bulletin).
Laboratory Mammals, Embryology, 168 (rev.).
Life camps, 328.
Living Out, 305-312 (gen., fig.).
Look and Learn, 496 (rev.).
National Camp, 322-323 (gen., fig.), 328, 332 (sound pictures).
Nature Hikes—Ugh!, 247-248 (gen., fig.).
Nature in Print, 34, 50, 80, 106, 136, 164, 203, 259, 274, 317, 330, 370, 387, 426, 442, 482, 496.
Nature Leaflet, Cornell, 49 (rev.), 314, 315, 389 (rev.).
Nature Lore, 217.
Nature teachers, 384, 388.
Naturalists, Early, 442 (rev.).
Naturalists, Military, 175.
Not So Red, 289-291 (gen., fig.).
Now That We Have to Walk, 259 (rev.), 274.
Oh, Come With Us, 528 (song).
Old Raccoon, 149 (song).
On Your Own, 497 (rev., manual).
One Touch of Nature, 191.
Pageant in the Sky, 317 (rev.).
Physical World, Study of, 504 (rev.).
Science Dictionary, 389 (rev.).
School Page, 46-47, 102, 104, 157, 159, 216, 220, 272-273, 328-329, 384, 388, 440-441, 493-494, 546.
Soldier, Meet Nature, 233-235 (gen., fig.).
Spice and Scent, 274 (rev.).
Spontaneous generation, 279-280 (gen.), 504.
Steep Acres, 164 (rev.).
Stories To Live By, 330 (rev.).
Systematics and the Origin of Species, 158 (rev.).
The American Biology Teacher, 146 (rev.).
The Best Things in Life, 64 (poem).
The Floor of the Ocean, 165 (rev.).
The Friendly Mountains, 136 (rev.), 164.
The Garment of God, 259 (rev.), 274.
The Great Chain of Being, 258.
The Military Naturalist, 157, 159.
The Oceans, 164 (rev.).
This Green World, 80 (rev.), 106.
Tracks Our Boys May See, 243-246 (gen., fig.).
Trail Manual, 229.
Wildlife on farms, 225.
Woodcraft League, 305.
Work Book in Gen. Botany, 112 (rev.).

PARKS AND REFUGES

Appalachian Trail, Guide, 218 (rev.).
Jackson Hole, 425.
Monument, Jackson Hole, 273.
Municipal and County Parks, U. S., 48 (booklet).
National Park, 119 (use), 287.
Everglades, 537 (editorial).
National Park Stamps, 108.
Parks and Recreation Progress, 106 (rev.).
Parks, Illinois, 496 (rev.).
Indiana, 285.
Public Recreation, N. H., 274 (rev.).
Redwood Grove, Morton, 271.
Sequoia Grove, North Calaveras, 278.
South Calaveras, 278.
Wildlife Refuges, 317 (rev.), 330.

PHOTOGRAPHY

Camera Trails, 2-3, (gen., fig.), 5, 58-59, (gen., fig.), 114-115, 170-171, 226-227 (gen.), 282-283 (gen., fig.), 338-339 (gen., fig.), 394-395 (gen., fig.), 450-452 (gen., fig.).
Films, educational, 49.
Films for Britain, 5.
Photography and Conservation, 282.

PHYSICAL PHENOMENA

Corposant, 160.
Corpse candles, 135.
Eerie Lights, 135 (gen., fig.), 160.
Elf fire, 135.
Fire-balls, 135 (fig.).
Fox-fire, 135.
Haleakala, crater, 32 (fig.).
Ignis fatuus, 160.
Jack lamp, 135.
Jack-o'-Lantern, 135.
Kit-of-the-Candlestick, 135.
Lantern men, 135.
St. Elmo's fire, 160.
Segula, volcanic cone, 42 (fig.).
Snowflakes, 17 (poem).
Sound range, bassoon, 84.
bass clarinet, 84.
bass tuba, 84.
bass viol, 84.
cello, 84.
flute, 84.
French horn, 84
human hearing, 84.
oboe, 84.
piccolo, 84.
telephone, 84.
trumpet, 84.
viola, 84.
violin, 84.
Sound, Study of, 102.
Sounds, hearing, 81-88 (gen., fig.).
Stalactite, 357.
Wat, 135.
Water in Wrong Place, 308 (gen., fig.), 309.
Ways of the Weather, 164 (rev.).
When the Typhoon Blows, 50 (rev.).
Will-of-the-Wisp, 135.

PLANTS, GENERAL

Abaca, Manila, 431 (gen.).
Acorus calamus, 371.
Agave rigida sisalana, 421 (gen.).
Algae, 127.
Amanita muscaria, 222.
phalloides, 222.
Anemone hirsutissima, 141.
nuttaliana, 141.
patens, 141.
Apocynum cannabinum, 423 (gen.).
Arbutus, trailing, 140.
Argyroxiphium macrocephalum, 31.
Asclepias syriaca, 422 (gen.).
Asparagus, 204, 375.
Aster, China, 352.
Aster novae-angliae, 415.
Baby's breath, 413.
Bean, 204, 374.
Bean, green, 321.
Kentucky wonder, 204.
lima, 320.
Potomac, 204.
soy, 204, 319.
sprouts, 190.
stringless green pod, 204.
Tendergreen, 204.
Beet, 205.
Detroit Dark Red, 205.
Early Wonder, 205.
Red Ball, 205.
sugar, 461-464 (gen., fig.), 498.
Bladderwort, 357.
Broccoli, 204.
Browallia demissa, 415.
elata, 415.
Brussels sprouts, 204.
Bulrush, 418.
Burlap, 417.
Cabbage, 94 (fig.), 204, 319, 321.
Chinese, 374.
crinkled, 204.
Savoy, 204.
Cactus, cholla, 474 (fig.).
flapjack, 521.
prickly pear, 180.
rainbow, 473 (fig.).
teddy-bear, 521.
Cactuses, 473-477 (gen., fig.).
Calamus, 371.
Cannabis sativa, 422 (gen.).
Carrot, Chantenay, 205.
Tendersweet, 205.
Caryophyllum saxatilis foliis gramineis, umbellatis corymbis, 413.
Castalia odorata, 153.
Cattail, 418 (fig.), 419, 420 (gen.).
Cauliflower, 204.
Celery, 205.
Chard, 321.
Swiss, 205.
Chives, 205.
Chlorophyll, 409.
Cholla, 521.
jumping, 521.
Cholla and Creosote, 519-522 (gen., fig.).
Chrysanthemum, 413, 414.
Cinnamon sedge, 371.
Clover, 415.
crimson, 376.
Collards, 205.
Columbine, 189.
Corchorus capsularis, 421 (gen.).
Corn, 205, 320, 374.
Golden Bantam, 205.
Golden Cross Bantam, 205.
Marcross, 205.
Spancross, 205.
Cosmos, 413.
Cotton, 408, 417 (fig.), 418, 419, 420 (gen.).
Cranesbill, 378.
Cucumber, 205.
Daffodil, 415.
Dahlia, 413, 415.
Dandelion, 320, 351.
Death angel, 222.
Delphinium, 189.
Desmids, 392 (rev.).
Dittany, 265.
Dog-fennel, 349.
Dulse, 127 (fig.), 128 (fig.).
Dulsing, Dark Harbour, 127-128 (gen., fig.).
Echeveria setosa, 474 (fig.).
Echinocereus rigidissimus, 473 (fig.).
Egg-plant, 374.
Endive, 205.
Epiphyllum latifrons, 474 (fig.).
Euphorbia lactea, 475 (fig.).
mammillaria, 475 (fig.).
Fern, brake, 419.
Fern, fossil, 25 (fig.).
Fern spore, 350.
Fibers, 440-441 (gen.).
Fittonia argyroneura, 413 (fig.).
Flax, 418 (fig.), 423 (gen.).
Fly agaric, 222.
Forsythia, 415.
Fraxinella, 265.
Fungi, 160.
Gas plant, 265, 266.
Geranium, Bicknell's, 378 (gen., fig.).
Ginseng, 211.
Gladdon, 371.
Gossypium hirsutum, 421 (gen.).
Grass, blue-grass, 349.
brome, 350.
bunch, 350 (fig.).
canary, 349.
crab, 376, 493.
fescue, 350.
myrtle, 371.
quack, 349 (fig.).
red top, 350.
timothy, 350.
vernal, 349.
Growing the Painted Trillium, 69 (gen., fig.).
Gypsophila, 413.
Helianthus, 415.
Hemp, bow-string, 417 (fig.), 418, 422 (gen.).
Indian, 418, 419 (fig.), 423 (gen.).
Manila, 419 (fig.).
Sisal, 421 (gen.).
soft marijuana, 422 (gen.).
Herb Robert, 378.
Indigo, 121, 123.
Iris, 373, 376, 415.
Jack-in-the-Pulpit, 371, 373.
Jute, 417 (fig.), 418.
Indian, 419, 420 (gen.).
Kohl-rabi, 205.
Leek, 205.
Lettuce, 205, 210, 321, 374.
Cos, 205, 374.
Lichen, 357
Lily, 261.
Easter, 349.
Linen, 408.
Linum usitatissimum, 423 (gen.).
Manila, 418.
Mayflower, 413.
Michigan Plants, Exhibits of, 48.
Milkweed, 419 (fig.), 422 (gen.)
Muck-i-go-ba, 208.
Muskmelon, 205.
Mustard, 205, 206, 374.
Musa texitilis, 421 (gen.).
Mushrooms, Common Edible, 160 (rev.).
Myrtle, sedge, 371.
Narcissus, 415.
Nettle, 418, 419 (fig.), 422 (gen.).
Nettle leaf, 222 (fig.), 223.
Nymphaea odorata, 414.
Oenanthe crocata, 222.
Onion, 95 (fig.), 205, 319.
Parsley, 206, 321.
Parsnip, 206, 319.
Pasque Flower, 140-141 (gen., fig.).
Pea, 205, 206, 318, 320, 321.
Peanut, 343, 408.
Peony, 376.
Pepper, 206.
Petunia, 413.
Pigweed, 349.
Plantain, 349.
Plants, edible, 499 (rev.).
Plants We Eat and Wear, 330 (rev.).
Pollen collecting, 349-351 (gen., fig.).
Poppy, opium, 121.
Potato, 206, 319, 408.
sweet, 319, 343.
Pulsatilla, 141.
Pyrethrum, 209.
Radish, 206, 374.
Ragweed, 349, 455.
Restoring the Pond Lily, 153 (gen., fig.).
Rhodymenia palmata, 127.
Rhubarb, 222, 375.
Rockweed, 127, 128.
Rose, 376.
Rutabaga, 206.
Rye, 350, 376.
perennial, 349 (fig.).
Salsify, 206, 319.
Sansevieria zelanica, 422 (gen.).
Sasa japonica, 412.
Scientific names, 413-415 (gen., fig.).
Seaweed, 127.
Sempervivum tectorum, 414, 415.
Silversword, Hawaiian, 31-32 (gen., fig.).
Sisal, 417 (fig.), 418.
Skunk cabbage, 349, 371, 373.
Spinach, 206, 321, 349.
New Zealand, 206.
Squash, 206, 319, 374.
Stapelia bicolor, 475 (fig.).
pegleria, 475 (fig.).
Strawberry, 375.
Succulents, Lure of, 473-477 (gen., fig.).
Sunflower, 415.
Sweet flag, 371-373 (gen., fig.).
Sweet myrtle, 371.
Sweet root, 371.
Sweet sedge, 371.
Teliospores, 334 (fig.).
The Loveliest Flower, 207 (poem).
Tomato, 206, 320, 374.
yellow, 236.
Trifolium, 415.
Trillium undulatum, 69 (fig.).
Tumble-weed, 282 (fig.).
Turnip, 206, 321, 374.
Typha angustifolia, 421 (gen.).
Urtica dioica, 442 (gen.).
Useful Plants of World, 388 (rev.).
Vetch, winter, 376.
Violets, North America, 53 (rev.).
Water hemlock, 222.
Water-lily, white, 415.
Wheat, 408.
Wheat smut, 350.
Wheat Stem Rust, 278-279 (gen., fig.), 334 (fig.).
Zinnia, 265, 413, 415.

REPTILES AND AMPHIBIANS

Boa constrictor, 152 (fig.).
Cerastes, 243.
Chuckwalla, 519.
Cobra, 223, 290 (fig.).
Copperhead, 224.
Elaphe obsoleta, 303.
Eurycea maculicauda, 358.
Frog, 137-139 (gen., fig.), 222, 318.
bull, 86, 137, 138 (fig.), 139.
common tree, 137, 138 (fig.).
green, 86, 137 (fig.).
leopard, 137, 139 (fig.).
spring peeper, 137, 138 (fig.).
swamp tree, 137.
wood, 137.
Frog Embryology, 166-168 (gen., fig.).
Handbook, Frogs and Toads, 50 (rev.).
Liberty and Justice (turtles), 276.
Lizard, 253, 303.
Moccasin, 151, 152, 224.
cotton-mouth, 151, 152, 241.
Newt, red, 222.
Poisonous Reptiles of World, 229 (rev.).
Puff adder, 66.
Rattlesnake, 86, 224, 365.
diamond-back, 521.
Reptile, 27 (fig., fossil), 86.
Salamander, 86, 222, 358.
Sand viper, 243, 244 (fig.).
Snake, 210, 318 (fig.).
banded, 151.
black, 302-304 (gen., fig.).
brown water, 150 (fig.), 151, 152.
chicken, 150, 151 (fig.), 152, 160.
coral, 224.
corn, 160.
garter, 222.
green water, 151, 152.
hog-nosed, 86.
king, 152.
red-bellied water, 150 (fig.), 151 (fig.).
sea, 224.

Snakes, Harmless, as Pets, 150-152 (gen., fig.), 160.
Terrapin, diamondback, 493.
Toad, 86, 137-139 (gen., fig.), 402.
  spade-footed, 137.
Tortoise shell, 158.
Turtle, 86, 276.
Voices of Spring, 137-139 (gen., fig.).

TREES AND SHRUBS

Abelia grandiflora, 262.
Abies balsamea, 534.
  concolor, 534.
Acacia, 74.
Andromeda, 260, 262.
Apple, 319, 321, 374.
Apricot, 236, 321.
Arborvitae, 531 (fig.), 535 (gen.).
Arbutus, 262, 414.
Ash, basket, 421 (gen.).
  black, 417(fig.), 418, 419, 420(gen.).
Autumn Leaves, 436 (poem).
Azalea, 260 (fig.), 261 (fig.), 265.
  Chinese, 262.
Azalea japonica, 262.
Azaleas for Everyone, 260-262 (gen.).
Baked apple berry, 236 (gen., fig.).
Bamboo, 411-412 (gen., fig.).
Barberry, 334 (fig.).
Basswood, 417 (fig.), 418, 420 (gen.).
Bayberry, 189.
Bean, coffee, 13 (fig.).
Bearberry, 260, 262.
Big tree, 531 (fig.), 535 (gen.).
Birch, 419.
Blackberry, 375.
Blueberry, 236, 260, 262.
Bogberry, 236.
Box-elder, 144.
Box Elders, 242 (poem).
Brake apple, 236.
Buckthorn, 73, 74.
Burro-bush, 521.
Caffeine, 9, 10, 13.
Cascara, 73 (fig.), 74 (fig.), 75 (fig.).
Cascara Goes to War, 73-75 (gen., fig.), 108.
Cedar, 419.
  red, 418, 531 (fig.), 535 (gen.).
  white, 419 (fig.), 420 (gen.).
Chamaecyparis nootkatensis, 420(gen.)
  thyoides, 420 (gen.).
Chamisa, 184.
Cherry, black, 352.
  sour, 374.
Chestnut, 419.
Chittimwood, 73, 74.
Cholla, 522.
Chrysil, 184.
Chrysothamnus, 184.
Cinchona, 122.
Cloudberry, 236.
Cocoa, 13.
Coconut, 210.
Coffea arabica, 9-13 (gen., fig.).
Coffee, 10 (fig.), 11 (fig.), 12 (fig.).
Cola, 13.
Cotoneaster, 237.
Cottonwood, 419.
Creosote, 521, 522 (fig.).
Crowberry, 236.
Currant, 375.
Cypress, 418.
  Alaska, 420 (gen.).
Dirca palustris, 418.
Dogwood, 74.
Edelweiss, 236.
Elder, 189.
Elm, American, 418, 419.
  slippery, 418.
Epigaea repens, 413.
Escalonia, 237.
Evergreens Forever, 529-536(gen., fig.)
Ficus aurea, 191 (fig.).
  elastica, 191, 229.
Fig, 236, 321.
  strangling, 191 (fig.).
Fir, 419.
  balsam, 530 (fig.), 534 (gen.).
  Douglas, 530 (fig.), 535 (gen.).
  silver, 531 (fig.), 534 (gen.).
Fogberry, 236.
Formosa camphor tree, 158.
Fraxinus nigra, 420 (gen.).
Gingko, 415.
Gooseberry, 375.
Grape, 374.
  wild, 419.
Greasewood, 349.
Hawthorn, 189.
Hazel, 74.
Heather, 262.
Hediondilla, 521.
Hemlock, 39, 419, 531 (fig.), 535 (gen.).
Hevea, 229.
Hibiscus, 413.
Hickory, 418, 419.
Illinois Shrubs, Fieldbook, 389 (rev.).
Ironwood, 521.
Ivy, poison, 222, 402.
Joshua tree, 361, 521.
Juniper, 189.
Labrador berry, 236.
Labrador Tea, 208 (gen., fig.), 220, 236, 389.
Lady of Saint Lucie, 191 (gen., fig.).
Leatherwood, 418.
Ledum, 208.
Locust, black, 418.
Maple, sugar, 455.
Mate 13.
Moss berry 236.
Moss sphagnum, 236.
Mountain ash, 189, 260, 262, 352.
Nandina, 237.
Nectarine, 374.
Oak, black, 495 (fig.).
  leaf, fossil, 26 (fig.).
  white, 299, 418, 419.
Ocotillo, 521.
Orange, 121.
Osage orange, 418.
Palmetto, cabbage, 191 (fig.).
Palo verde, 521.
Pawpaw, 418.
Peach, 321, 374.
Pear, 321.
Pepper-tree, 189.
Picea excelsa, 534.
  pungens, 534.
  rubens, 533.
Pine, 412.
  Austrian, 530 (fig.), 533 (gen.).
  digger, 419.
  lodgepole, 529 (fig.), 533 (gen.).
  longleaf, 419, 530 (fig.), 532 (gen.).
  Mugho, 429 (fig.), 533 (gen.).
  pitch, 389 (fig.), 529 (fig.), 532 (gen.).
  red, 39 (fig.), 529 (fig.), 532(gen.).
  Scotch, 529 (fig.), 533 (gen.).
  sugar, 349.
  white, 39, 529 (fig.), 532 (gen.).
Pinus nigra, 533.
  contorta murrayana, 533.
  mughus, 533.
  palustris, 532.
  resinosa, 532.
  rigida, 532.
  strobus, 532.
  sylvestris, 533.
Pinyon nut, 263.
Plum, 412.
Plywood, 408.
Poplar, 375.
Pseudotsuga taxifolia, 535.
Pyrocantha, 237.
Rabbit brush, 184.
Raisin, 236.
Raspberry, 375.
Rattan, 418, 419.
Redwood, 399, 530, 531 (fig.), 535.
  fossil, 27 (fig.).
Rhamnus purshiana, 73.
Rhododendron, 260, 261, 262, 413.
Rose, dwarf, 466.
Rubber, 418.
Rubus chamaemorus, 236.
Saguaro, 521.
Salix amygdalina, 420 (gen.).
  fragilis triandra, 419.
  purpurea, 420 (gen.).
Sassafras, 189, 413, 415.
Sassafras Tea, 14 (gen., fig.), 52, 53.
Sequoia gigantea, 535.
  sempervirens, 535.
Sheep laurel, 236.
Shrubs, Ornamental American, 50 (rev.).
Snowberry, 405 (fig.).
Spruce, blue, 531 (fig.), 534 (gen.).
  Norway, 530 (fig.), 534 (gen.), marketing, 531, 536.
  red, 530 (fig.), 533 (gen.).
  white, 39, 419.
Sumac, 189.
Sweet gum, 419.
Tamarack, 419.
Tannin, 530.
Thorn-apple, 352.
Thuja occidentalis, 535.
Tilia americana, 420 (gen.).
Today the Elm, 40 (poem).
Toyon, 237.
Tsuga canadensis, 535.
Vine, grape, 419.
Virginia creeper, 189.
Walnut, black, 399.
Willow, 74, 375, 418.
  basket, 419.
  green, 421 (gen.).
  Küsterman's, 419.
  purple, 421 (gen.).
Witch hazel, 419.
Yellowberry, 236.
Yucca, 362 (fig.), 521.

MISCELLANEOUS

A Boy's Birthright, 89 (poem).
A Brief for Laughter, 268 (poem).
Apparatus, high-vacuum, 126 (fig.).
A Season's Gift, 429 (poem).
Autumn's Lesson, 376 (poem).
Axes, Camp, 311 (gen., fig.), 312.
Beyond the Clapping Mountains, 482 (rev.).
Billboards, 119, 287, 313.
Borrowed Clothes, 262.
Byways to Adventure, 34 (rev.).
California Historical Quarterly, 175 (rev.).
Campsites, 309 (gen.).
Certitude, 415 (poem).
Charcoal, 181.
Chinese Proverbs, 318 (gen., fig.).
Civic Annual, 274 (rev.).
Coal tar, 121, 123.
Companionship, 99 (poem).
Contents noted, 7, 63, 119, 175, 278, 399, 455, 511.
Contrast, 236 (poem).
Copra and Lather, 218.
Cyclotron, 158.
Discovery, 354 (poem).
Drink Safe, 307 (gen., fig.), 308.
Enemies, Not in Uniform, 295-298 (gen., fig.).
Evening, 326 (poem).
Fag Bags, Girl Scouts, 48 (fig.).
Finger Prints, 556 (rev.).
First Aid to Diets, 190 (gen., fig.).
Five C Clubs, 443.
Fossils, ancient, 25-28 (gen., fig.).
Grass Houses, 25-37 (gen., fig.).
Grassroot Jungles, 34 (rev.), 50.
Heat for food, 310 (gen., fig.).
Hello! Do You Hear Me?, 81-88 (gen., fig.).
Highway Fatalities, 48.
History Repeats, 89 (cons.).
Hobby, Perfect, 485-486 (gen., fig.).
How Miracles Abound, 443 (rev.).
Indian murals, 427 (fig.), 428 (fig.), 429 (fig.).
Indian tribes, 371.
Journey into America, 538, 550 (rev.).
Keeping Warm Outdoors, 310 (gen., fig.).
Lamp, incandescent, 181.
Let's Not Get Lost, 306 (gen., fig.), 307.
Living Things of Old, 25-28 (gen., fig.).
Miniature, 128 (poem).
Mr. Tompkins in Wonderland, 280.
Napoleon's Army, 297 (fig.).
National War Fund, 499.
Nature Buttons, 359-360 (gen., fig.).
Near Horizons, 34 (rev.).
Neoprene, 122 (fig.).
Nylon, 121, 125 (fig.), 424.
Our Palace Wonderful, 47 (rev.).
Patsy's Cave, 357-358 (gen., fig.), 388.
Perilous Island, 50 (rev.).
Pippa Passes, 79 (poem).
Prophets, 68 (poem).
Quinine, 122, 126.
Rope, 312 (gen.).
Rubber, 408.
  Indian, 184 (gen., fig.).
  synthetic, 121, 122 (fig.).
Saws, 312.
Sod house, 35 (fig.).
Some Day, 192 (poem).
Something's in a Name, 264 (poem).
Spike of Swift River, 50 (rev.).
Sporozoite, 296.
Story Parade, 50 (rev.).
Substitutes and Synthetics, 499 (rev.).
Survival of the Fittest, 433 (poem).
Synthetics, Kingdom of, 121-126 (gen., fig.), 158.
Tears, 380 (poem).
Terrors of the Deep, 487-490 (gen., fig.).
The Golden Throng, 34 (rev.).
The Hunter, 326 (song).
The Tie That Binds, 417-421 (gen., fig.).
Together, 292 (poem).
Trailer Trio, 50 (rev.).
United Nations Emblems, 465-471 (gen., fig.).
Urea, 126.
Wake Island, 186 (fig.), 187 (fig.).
War, instruments for, 287.
We Took to the Woods, 203 (rev.), 218.
Wee Neighbor, 248 (poem).
Without Sight or Sound, 134 (poem).

AUTHORS

Aler, Lulu M., 299-301, 332.
Allis, M. L., 376, 545.
Arnold, Sallie, 258.
Atwood, E. P., 265-268.
Bangs, Janet N., 206.
Barlow, Marie, 208, 220.
Barnes, L., 18.
Beise, C. J., 523-526.
Bernetta, Sister M., 156.
Blackford, J. L., 188-189, 379, 519-522, 552.
Bonner, W. H., 153, 191, 258, 262.
Bradt, G. McC., 249-253.
Bradford, Genevieve, 507.
Brigham, E. M., Jr., 364.
Bronson, W. S., 430-433, 513-518.
Brotherston, Bernice, 128.
Broun, M., 144, 191.
Browning, R., 79.
Bulla, P., 434-436.
Buscho, Jayne K., 247-248.
Churcher, P., 326, 354, 485-486, 522, 526.
Clarke, T. E., 96-97, 109.
Clemes, Elise, 349-351.
Clodfelter, F., 43, 480.
Cook, Alice S., 377.
Corrington, J. D., 54-56, 110-112, 166-168, 222-224, 334-336, 390-392, 446-448, 502-504, 554-556.
Culp, Harriet, 147-149.
Davis, E. B., 483-484, 500.
Deike, U. C., 380.
Denzel, J., 233-235, 302-304, 357-358.
Derleth, A., 499.
Devoe, A. E., 401-404.
Dexter, R. W., 501.
Dillingham, Pauline, 436.
Douglas, Prudence W., 64.
Eigsti, W. G., 100-101, 104.
Evans, Edna H., 276.
Fenton, C. L., 25-28, 69, 471.
Fenton, Mildred A., 25-28.
Finley, Irene, 263-264.
Fisher, Lenore E., 42.
Fleming, J. W., 427-429.
Fuller, Ethel R., 17.
Gleason, Louisa R., 378.
Gonso, Fleta B., 89.
Graves, W. C., 486.
Groff, C. W., 142.
Hansen, Jean C., 270.
Harkness, N. W., 2-3, 5, 58-59, 114-115, 170-171, 226-227, 282-283, 338-339, 394-395, 450-451, 506-507.
Harper, S. A., 373.
Hedgpeth, J. W., 202.
Hein, E., 293-294.
Heydinger, E. F., 192.
Hodge, H., 413-415.
Hodgson, Ruth, 473-475.
Hosmer, Margaret S., 492.
Howard, K. C., 527-528.
Howes, Mary P., 236.
Hubbell, Winifred W., 45.
Hudson, S., 70-72, 108.
Huggins, Mabel I., 76-77, 318, 411.
Hunt, James K., 121-126.
Hurd, H. E., 134.
Hurni, Grace K., 237.
Jaeger, E., 78-79, 184, 243-246, 276.
Jenkins, L., 367.
Jex, G. W., 295-298.
Keir, Grace, 90, 149, 268, 326, 528.
Keyes, C., 248.
Knower, Eve T., 549.
Laing, Edith M., 192.
Leighton, Louise, 207.
Lewis, Isabel M., 44-45, 98-99, 104, 155-156, 160, 213-214, 220, 269-270, 324-326, 381-382, 385, 437-438, 444, 491-492, 494, 544-545.
Marshall, C. C., 292.
McAtee, W. L., 14, 52, 53, 135, 160.
McCready, H. L., 389.
McCurdy, Marybell, 154.
Meadows, D., 361-363.
Menard, P., 429.
Mitchell, H. E., 150-152.
Moseley, R. L., 472.
Mowery, W. B., 209-212.
Murie, Joanne, 542-543.
Nelson, A. Z., 39-40.
Nelson, E. W., 15-17, 181-184.
Norton, Alma M., 380.
Oehser, P., 415.
Oliver, H. W., 356.
Ostlund, O., 99.
Pack, A. N., 89-90, 201-202.
Palmer, E. L., 46-47, 81-88, 102, 104, 157-159, 193-200, 216, 220, 272-273, 305-312, 328-329, 384, 388, 417-424, 440-441, 493-494, 529-536.
Parry, Elsie A., 487-490, 500.
Parsons, A. C., 29-30.
Partridge, E. D., 322-323, 332.
Passmore, L., 476-477.
Peabody, S., 22-24, 52.
Pidge, Florence E., 553.
Pigman, Edna A., 214.
Pittman, H. H., 91-92, 105, 405-406.
Preble, E. A., 137-139, 140-141.
Ranson, Virginia H., 541, 552.
Rogers, Gladys G., 232.
Rutledge, A., 65-68.
Sanderson, I. T., 457-460, 500.
Sawyer, E. J., 289-291.
Scheffer, V. B., 41-42.
Schorger, W. D., 348.
Schroder, H. H., 18, 240-242, 304.
Sharritt, Grace V., 352-354.
Sheldon, H. H., 19-21.
Shull, Thelma, 359-360.
Smith, E. H., 478-479.
Smith, Marion E., 262.
Smith, R. A., 416, 444.
Smith, S. C., 31-32.
Stanford, E. E., 407-410, 444, 445.
Steffek, E. F., 69, 153, 389.
Stocking, H. E., 185-187, 220.
Teale, E. W., 314-316, 332, 371-373.
Thompson, D. F., 177-180.
Thornton, Lalia M., 68.
Tomkins, Ivan R., 238-239.
Tracy, E. B., 355-356, 388.
Tyrrell, W. B., 255-256.
Van de Water, Virginia T., 345-348.
Van Duyn, G., 133-134.
Westwood, R. W., 7, 63, 119, 175, 231, 287, 343, 399, 455, 461-464, 498, 511.
Wheeler O. E., 38.
White, L. C., 264.
White, L. T., 129-132, 162.
Whittemore, Margaret, 35-37, 465-471.
Wiley, L., 73-75, 108.
Williams, Isabel, 40.
Wilson, Ethel, 127-128, 236.
Wing, A. S., 9-13, 93-95, 104, 202-206, 260-263, 319-321, 331, 374-376, 385, 539-540, 552.
Wing, Janet, 319-321, 331.
Woodall, A. E., 212, 242.
Zahniser, H., 34, 50, 80, 106, 136, 164, 203, 218, 259, 274, 317, 330, 370, 387, 426, 442, 482, 496, 538, 550.

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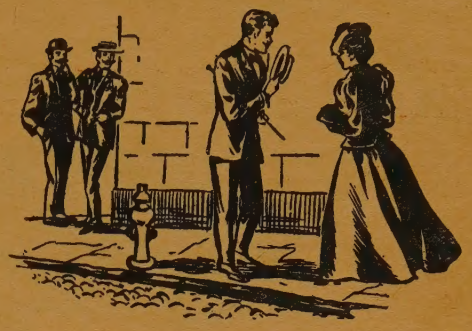

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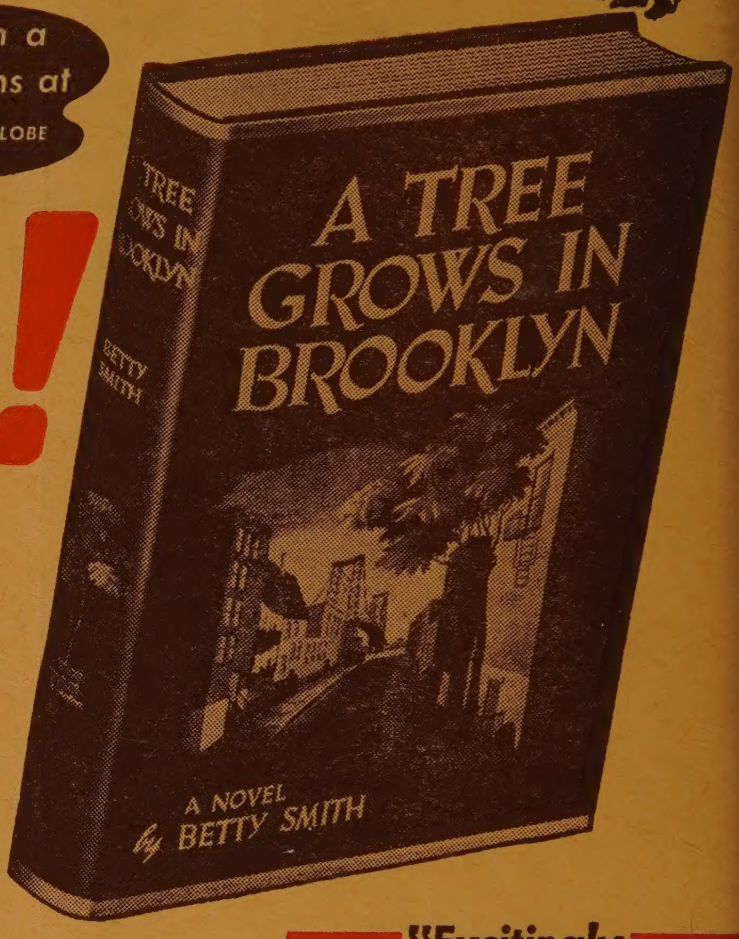

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